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The Determination of

Absorption of Wear

by Fabrics[1]

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LACK of standardization or uniformity of methods of analysis and technique is a decided handicap in many phases of textiles work. Studies, the results of which otherwise might be made statistical, are of little value because different methods have been used in obtaining data.

Among the methods now in use of determining rate and amount of water absorbed by fabrics are wet bulb thermometer, eosin dye, immersion, saturated atmosphere, and wet surface. These methods were compared by Stevenson and Lindsey[2]. They concluded that the wet surface method most nearly approaches the actual conditions under which the fabric is used and is a practical method. Later Haven[3] published a description of an entirely different method of procedure.

The purpose of this study was to compare the accuracy and suitability of eosin dye, wet surface and Haven's method. Turkish toweling and knitted rayon fabric that had been thoroughly washed and allowed to dry were used. All work was done in a laboratory maintained at standard conditions of relative humidity and temperature. Unless otherwise stated all fabrics were conditioned in the laboratory before testing.

It was found that with slight changes of technique Haven's method is comparatively accurate and rapid for testing the rate of absorption of water by fabrics such as Turkish toweling, providing the work is done under controlled conditions of relative humidity and temperature. However, this method is not usuable with knit fabrics. For this type of material a modification of the wet surface method as described by Stevenson and Lindsey proved to be accurate and suitable even when atmospheric conditions were not controlled.

In testing the eosin dye method, strips of Turkish toweling one inch wide and 6 inches long were marked at ½ inch intervals with India ink. The dye was sprinkled lightly over the surface of the specimens which were then hung over a tray of water with the ends touching the water. Absorption of water dissolved the dye and by means of the India ink markings it was comparatively easy to determine the rate of absorption from the distance water rose in the strips in a definite period of time. A large percentage of inaccuracy might exist in the data because of the slight distance which liquid rose vertically in the fabric. The introduction of dye may have changed the nature of the material, thereby influencing the rate of absorption, and the irregularity of distribution of dye on the fabric added to possible inaccuracy. For these reasons the eosin dye method was not considered further.

The rate of increase in weight of a fabric when placed on a wet brick is the basis for determination of the rate of absorption in the wet surface method described by Stevenson and Lindsey. In their work a brick was immersed in water for 1½ hours, after which it was allowed to drain for 1½ hours and was not returned to the water for the test. Variations in structure of bricks and the fact that the first specimens coming in contact with the brick absorbed moisture and would leave less

[1]Contribution No. 41, Department of Home Economics.
[2]Lilian Stevenson and Margaret Lindsay. Methods of testing the absorption of water by cotton toweling. Jr. Home Ec., Vol. 18, No. 4 (1926, April pp. 193-198.)
[3]George B. Haven, Future Textiles Laboratory Practice. Amer. Dyestuff Reporter, Vol. 19 (1930 Dec. 8), p. 761.

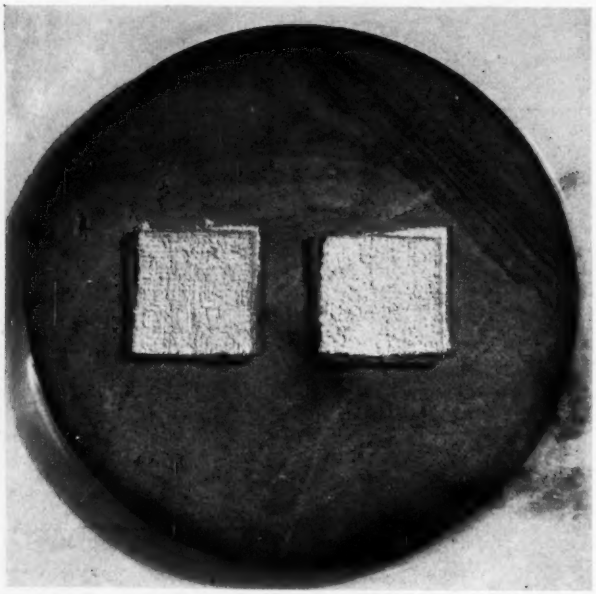

Fig. 1—Specimens of toweling placed on unglazed porcelain disk and covered with glass, the disk being kept in a pan of distilled water throughout the test.

moisture for the following specimens presented possible sources of inaccuracy.

A 10 inch unglazed porcelain disk, purchased from Monmouth Pottery Company, Monmouth, Illinois, was therefore substituted for the brick. This disk became saturated in a few minutes and an even surface moisture was maintained during the entire test by keeping the disk in a pan of water.

Turkish toweling was used in this test. Specimens 2 inches square that weighed approximately one gram were dried in the conditioning oven and cooled in a desiccator. A specimen was placed on the disk, covered with a square of glass and allowed to remain for periods of 30 seconds (Fig. 1). At the end of the first 30 second period the specimen of fabric was placed in a tared weighing bottle and weighed on a chainomatic balance. It was then replaced on the disk, covered with the glass and allowed to remain an additional period of 30 seconds. This procedure was repeated until the fabric became saturated, that is, when its weight became constant. Results of several tests are shown in Chart I.

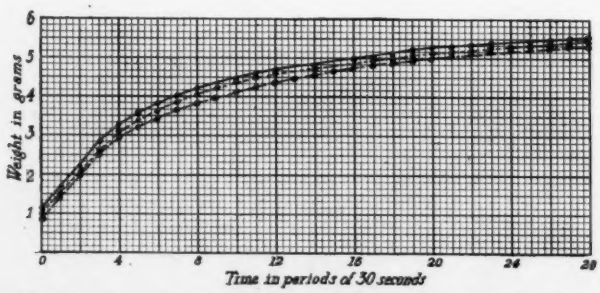

Chart I—Rate of Absorption by three specimens of the same turkish toweling as measured by the wet surface method.

Haven's method of measuring the absorption of water by fabrics requires a table with a ground-glass top illuminated from beneath. This table was constructed as shown in Figure 2. A shelf was so arranged that a tray

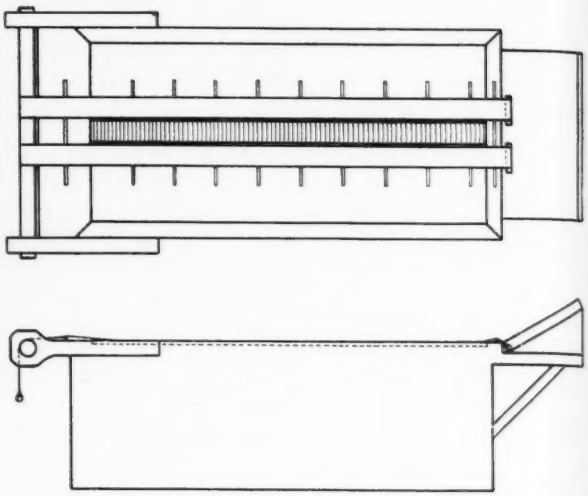

Fig. 2—Light box showing specimens in position, also glass rods placed at intervals and at end of aable, large rod over which fabrics are held taut.

containing water could be tilted at an angle of approximately 45° and so placed that the surface of the water was on a level with the top of the table. Distilled water at room temperature was used. Strips of Turkish toweling cut one inch wide were laid across the top of the table so that one end could be immersed in the water. It was necessary to prevent the cloth from touching the table top and to do this small glass rods were laid at intervals along the top with the toweling resting upon them. In an effort to maintain an even tension, steel weights approximately 2 grams each were placed in loops sewed in the end of the fabric which was to be placed in the water, and the other end of the strip was clamped onto the table. These precautions did not prevent the wet fabric from coming in contact with the glass and this contact resulted in the formation of a pool of water which furnished a new source of supply. The technique was varied in an effort to overcome this. Results of these variations are shown in Chart 2. A large glass rod placed at the end of the table in such a manner that the strips weighted at both ends fell over it and were allowed to hang free instead of being clamped to the table eliminated the difficulty. By this means the slack due to the absorption of water was automatically taken up and the strip held taut.

Illumination of the table from beneath made visible the movement of the absorption line along the cloth. Two or more strips of fabric were laid on the table with strips of graph paper mounted between them. This paper served as a measuring scale (Figure 3). Not less than 2 strips

(Continued on page 743)

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

DECEMBER 31, 1934

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FOURTEENTH ANNUAL MEETING
Friday Evening Session
December 7, 1934

THE Fourteenth Annual Meeting of the American Association of Textile Chemists and Colorists convened at the Hotel New Yorker, New York City, at eight o'clock, Dr. R. E. Rose, President of the Association, presiding.

President Rose: Will the meeting please come to order?

It gives me the very greatest pleasure to open the Fourteenth Annual Meeting of the American Association of Textile Chemists and Colorists. This meeting promises to be the most important one in our history, and it is characterized by a most excellent program, which we owe to the efforts of the local Section, and to the chairman of the Program Committee of the National Association.

This program is very full, and it will be absolutely necessary for us to adhere to the time schedule if we are to get through. It is for that reason that I am starting as promptly as possible, and I wish, before we enter upon the regular program, to tell you that tomorrow morning the program will be advanced. It is called for nine-thirty, if you will look at your programs, but it will start at nine, and I wish to tell you that there is a feature, which I think you will all find of great interest, which has been added to the program, at nine o'clock. There is a machine which is a scientific implement. This instrument is in Room 526, I believe, and at nine o'clock tomorrow morning, Mr. Wentz, who is the inventor of it, will assist those who are interested in understanding the principles upon which this instrument works. That will be the feature for nine o'clock. There was no place on the program for it, other than pushing the program back or forward, if you like to call it that. The official program will start at nine-thirty and I want all of you to know that the technical papers are worth listening to, and to make an effort, in spite of the late hour at which we may break up, to be there on time.

Our program tonight calls for a rayon symposium, and the first speaker on our list is Dr. J. F. X. Harold, who will now address you. (Applause.)

Proceedings of the American Association of Textile Chemists and Colorists

RAYON SYMPOSIUM

Dr. J. F. X. Harold: Gentlemen, I will be very brief because the time allotted to the real rayon symposium which follows my brief speech is extremely small.

I must first, however, register a protest and a regret. I had intended, in fact it was told to me that I should trace the history of rayon, and I had expected, in the first hour to discourse on pre-historic rayon, and then devote the next hour to historic rayon, and then the next hour to the present rayon industry. Finally, when the multitude had filed in from the surrounding neighborhood, thrilled to the voice that had prevailed for three hours, I was going to talk on the rayon of the future, being speculative at both ends—that is, the future of rayon and prehistoric rayon of which I have been unable to find a word in the text.

However, I am deeply conscious of my place in this situation under the horrible restriction of one hour to cover so important a subject, and that divided among three gentlemen who are pioneers and pathfinders in this industry which certainly needs pathfinding.

To show, however, that I am deeply conscious of the importance of the speakers who are to follow me and humbly aware of my own lack of information on the matter, I shall introduce the speakers with a final story. It has to deal with a German gentleman who had never been to America, but who was an enthusiastic horseman. He didn't speak a word of English, or at the most, very few words.

So he arrived in Boston, and he never missed an opportunity of indulging before breakfast in his usual exercise, the equestrianship. He got on the horse, and he knew that Boston horses weren't used to being talked to like they were in Berlin. He couldn't think of the word, but finally the word came to him and he said, "Commence!" (Laughter and applause.)

President Rose: The next speaker will be Dr. J. B. Quig of the du Pont Rayon Company. Dr. Quig! (Applause.)

A Necessary Background for the

Production of Quality Rayon Fabrics*

By **J. B. QUIG, Ph.D.**
Du Pont Rayon Co.

QUALITY FABRIC

WHAT is a quality fabric? From the standpoint of the stylist and department store buyer, a quality fabric must possess certain adjuncts which they describe as drapability, softness, individuality, non-creasability, non-crushability and resistance to abrasion. Most of these factors are pre-processing considerations and are functions of the construction of the fabric, the denier, filament and twist of the yarns employed. Each of these factors are carefully weighed by the fabric designer, a particular construction is decided upon and the cycle of weaving, dyeing, finishing, inspection by the converter and cutting up into garments begins.

While the synthetic yarn manufacturer, weaver and dyer are all interested in the physical characteristics which define a quality fabric from the above viewpoint, they are vitally concerned in one of the criteria for a quality fabric; namely, *uniformity of dyeing*. When the stylist conceives the fabric and subsequently fashions his ideas into a design for the weaving, he takes it for granted that the fabric will, of course, have uniform dyeing qualities. It is not necessary for me to tell the dyers who are assembled here that ninety per cent of the difficulties encountered are concerned with non-uniform dyeing and that "warp streaks" and "filling bars" are the main factors which indicate to them whether a fabric is a quality fabric or not. A quality fabric as far as the weaver, the dyer and the converter are concerned, is primarily a fabric upon which they will not have to pay claims and thus lose their profit.

IMPORTANCE OF RAYONS AS TEXTILE FIBERS

In 1933 213,497,850 pounds of rayons went into the textile industry in the United States. The world production of rayon in 1933 was six hundred and twenty-six million pounds which is almost seven times the production of natural silk. This means that rayons have earned their birthright and have become an extremely important part of the world's fiber supply. It connotes that the very great improvement which has been made in strength, texture, fineness of filaments, mechanical quality, and uniformity of dyeing has been recognized. It predicts

*Presented at Annual Meeting, Dec. 7, 1934.

that rayons, and especially the vastly improved rayons which research will give the industry in years to come, are here to stay. It invites all persons who depend upon the great textile industry for their livelihood to study and to learn more about these important raw materials. It challenges the present manufacturers of rayon to further their research so that they may further fortify the basic properties of this man-made product.

The weaver, the knitter, the dyer and the textile machine manufacturer have had a very important part in improving the quality and furthering the acceptance of rayon fabrics. Great progress has been made in the design of new textile machinery for rayon and in the conversion of cotton and silk equipment for rayon processing.

BACKGROUND FOR PRODUCTION OF QUALITY FABRICS

Much has been learned but much remains to be learned about synthetic fibers. We are confident that if the available knowledge of the basic properties of these fibers was more widely disseminated and understood, the consistent production of uniform quality fabric would be easier and the losses incurred from defective fabric would be greatly minimized.

A necessary background for the production of quality rayon fabrics consists of having a knowledge of the physical characteristics of rayon. It can also be epitomized by the statement "Know your raw material." It is axiomatic that in order to design suitable machinery and processes for handling rayon or any other raw material, we must have a working knowledge of its general characteristics. It is of vital importance to know the physical limitations of a product in order that we may handle the product intelligently and fortify it in the various operations involved. We have encountered many difficulties because we have failed to recognize that rayon is a new and different textile fiber. While viscose process rayon and cotton are both cellulose, they differ from each other in many respects and must be processed differently. While the rayons resemble silk somewhat in appearance, they are different chemically and physically and must be handled differently.

Ten years ago when you purchased your automobile you found a notice pasted on the windshield which read as follows: "Don't drive this car over 25 miles per hour for the first 500 miles." Most of us obeyed this order because we knew that our automobile had to have this care in order for us to be the possessors of a first-class mechanism at the end of this mileage. There was a sound economic reason back of this admonition which had a bearing upon our happiness and upon our pocketbook.

The Rayon Sub-Committee of the American Association of Textile Chemists and Colorists with the cooperation of the various rayon producers, is attempting to aid the processors of rayon in a similar manner. In the past the rayon manufacturers' time and energy have been consumed to a very large degree in solving the manifold problems which occur in the everyday manufacture of rayon and in controlling a process which requires a minuteness scarcely credible in any manufacturing operation. During this period the weaving mills and dyers have done creditable and yeoman work. We are happy to state that it is now possible for the rayon producers to unite with the processors of rayon fibers in their studies involving the production of better rayon fabrics. The Rayon Sub-Committee has already published some helpful pamphlets. The talks which are being given tonight are the beginning of a program which we sincerely trust will be helpful. We approach the problem with the spirit that we know only a limited number of helpful facts but laboring with this spirit and with your cooperation we know we shall grow in helpfulness.

I wish to discuss with you one or two factors which directly or indirectly have a vital effect upon the uniformity of dyeing of rayons. A knowledge of the effect of excess and non-uniform tensioning and the consequent over-stretching and non-uniform stretching of rayon is of the greatest importance. It is also necessary to consider the moisture content of the rayon and its relation to the extension or stretching of the rayon fiber.

The rayon producers from the beginning have done everything possible to secure uniform tensioning of the fiber in all processes from the spinnerette to the finished package. All rayon is reeled, spooled, coned and copped under perfectly controlled humidity.

While the technical service departments of the rayon companies have done much in imparting this information to the trade, we still find a great lack of appreciation of the importance of tension and humidity control and their relation to uniformity of dyeing.

THE EFFECT OF UNEVEN STRETCHING UPON DYEING

(1) Hathorne[1] has determined that rayon threads stretched unequally will have non-uniform dye indices unless the threads are allowed to approximate their original position before the dyeing operation.

(2) Delph[2] has pointed out the following:

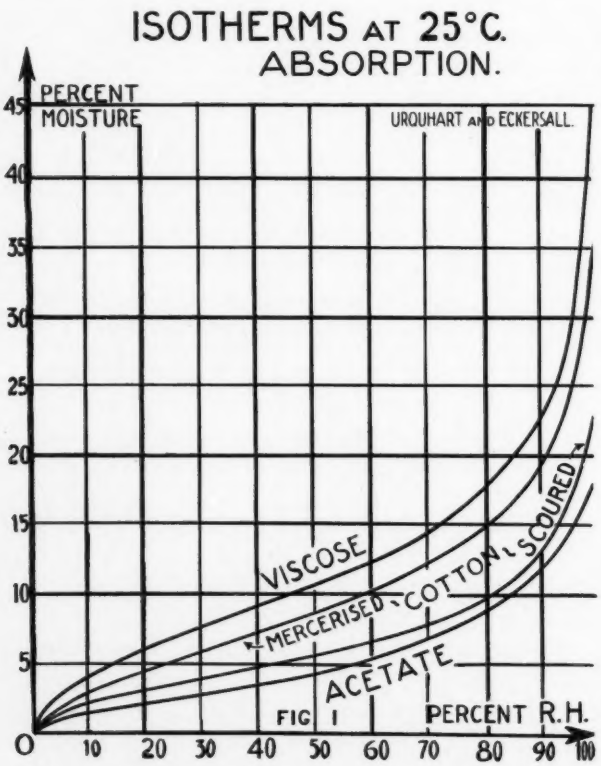
"If the stretch in the yarn is uniform, then the finished fabric will be uniform in appearance, although a piece in which the yarn has been stretched appreciably will have a different appearance and handle from a piece in which the yarn received little or no stretch. But if the stretch in the yarn is not uniform, then the contraction in the fabric will not be uniform and we have here an explanation of the obvious faults of bright picks and tight ends. Since the dyer and finisher can rarely correct errors made in processing, it is extremely important that every stage in the weaving and knitting mills should be

done under the best conditions, on the most suitable machinery, and that the operatives should be well trained for their particular job."

The absorption of moisture by any textile fiber alters the physical properties of the fiber. Since moisture control is so definitely indicated in rayon processing let us consider the general moisture relationships.

MOISTURE ABSORPTION OF COTTON VERSUS RAYON

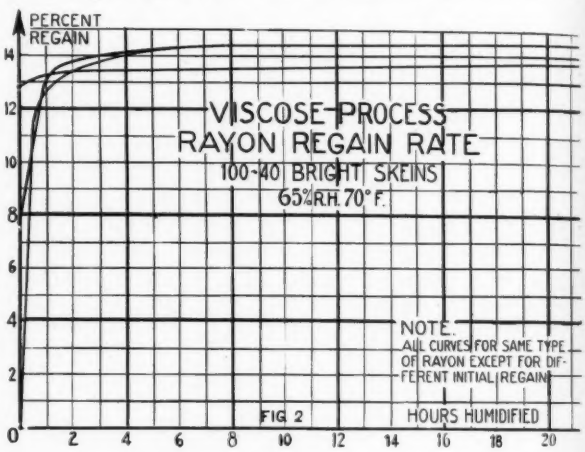
From the standpoint of their chemical constitution rayons may be divided into two main classes, the regenerated Celluloses (Viscose, Cuprammonium and Nitrocellulose) and the Cellulose esters (Cellulose Acetate). A consideration of their moisture relationships leads to a similar classification. (Fig. 1). The *regenerated* Celluloses have



at all humidities a higher absorption of moisture than mercerized cotton, while Acetate rayon has a lower absorption than ordinary scoured, raw cotton. Urquhart and Eckersall[3] in Fig. 1 show that regenerated Cellulose rayons have absorption curves similar to those given by cotton and mercerized cotton. It is indicated that the absolute values of the regain of the regenerated Celluloses are higher than those of mercerized cotton. This is worthy of consideration since mercerization—namely, a treatment with alkali gives a Cellulose with a coarser lattice structure and a higher water absorption than ordinary cotton at all vapor pressures. Sheppard and Newsome[4] advise that the regenerated Celluloses are similar materials. The inference is that the regenerated Celluloses have a coarser lattice structure than mercerized cotton. Since Cellulose Acetate rayon has a lower absorption of moisture, it is indicated that hygroscopicity is reduced by esterification of the Cellulose. Stated in different terms, the moisture absorption decreases as the hydroxyl groups of the Cellulose are replaced chemically by acid radicals.

RAYON REGAIN RATE

The term "regain" has reference to the percentage of moisture in rayon on a basis of weight to a bone dry condition. The regain rate curves are interesting because they show the time required for the rayon to come to equilibrium at a definite relative humidity and temperature. Fig. 2 deals with Viscose Process Rayon. It shows

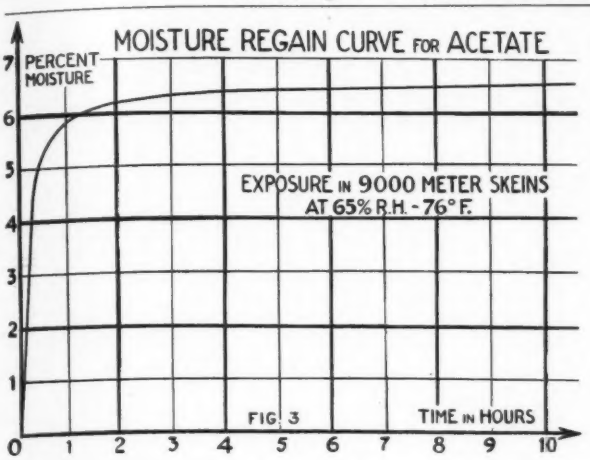


that Viscose Process Rayon when at equilibrium at 65% R.H. 70° F. has approximately 14.8% regain. Starting with bone dry rayon, 12.6% regain is attained after one hour's humidification. Eighty-five percent of the equilibrium moisture is absorbed in one hour. After 12.6% regain is reached it requires at least 24 hours to acquire 2.2% additional regain to reach equilibrium.

A second curve on this chart shows that if we humidify a Viscose Process Rayon having 7.5% regain, it requires 1¼ hours to reach 12.6% regain. A third curve shows that if we begin humidification at 13% regain a lower equilibrium value is obtained than if we humidify a bone dry or a 7.5% regain sample. This phenomenon has not been explained.

The "shipping" or commercial regain for Viscose Process Rayon is 11%. That is, a legal pound of rayon contains 11% of moisture based on bone dry rayon. The rayon producer adjusts the shipping weight to take care of moisture contents which are over or under 11%.

The next graph—(Fig. 3)—shows the regain rate curve for Acetate rayon. It shows that Cellulose Acetate rayon (Celanese, "Acele", Seraceta, Eastman, Chace-


MOISTURE REGAIN CURVE FOR ACETATE
PERCENT MOISTURE
EXPOSURE IN 9000 METER SKEINS AT 65% R.H. - 76° F.
FIG. 3
TIME IN HOURS
0 1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7

lon) when at equilibrium at 65% R.H. 70° F. has approximately 6.7% regain. Starting with bone dry Cellulose Acetate 5.8% regain is attained in one hour. Eighty-six and one-half percent of the equilibrium moisture is absorbed in one hour. It then requires 19 hours to acquire 0.9% additional regain to reach equilibrium.

The "shipping" or commercial regain for Cellulose Acetate rayon is 6½%.

While both of these curves indicate that 12 hours humidification at 65% R.H. and 70° F. will bring both of these rayons nearly to equilibrium, it is well to consider that the uniformity of moisture content depends upon the bulk of the yarn exposed, the nature of the package and the circulation of air. For this reason a safety factor of 10-12 hours should be added in order to guarantee uniformity of moisture content. This is especially important when drying crepe twist or any filling yarn. Improperly dried rayon is a hazard. "Shiners" often result from insufficient drying.

FAVORABLE ASPECTS OF ABSORBED MOISTURE

As Viscose rayon absorbs moisture it swells both transversely and longitudinally. This is explainable on the basis of the micellar structure. The absorbed moisture pries the micellae further apart and this reduces the attractive forces. It acts as an internal lubricant which minimizes the friction and allows the micellae to slide over each other more easily. The maximum swelling is obtained by thoroughly wetting out without any tension whatever and under these conditions Delph[2] states that the diameter of Viscose Process rayon increases by as much as 30% compared with the diameter at a normal humidity of 60%. The longitudinal extension under these conditions is approximately 4 to 6%.

A reasonable moisture content has distinct advantages. Rayon with a very low moisture content is brittle and rigid and it has a greater tendency to become charged with static electricity during processing. A reasonable percentage of moisture acts as an excellent softening agent. It is necessary to have 8 to 10% moisture in Viscose Process rayon and 6½% moisture in Acetate rayon to produce the necessary suppleness and pliability for good knitting and weaving.

Before considering the unfavorable aspects of too high moisture contents, it is well to consider the minimum and maximum humidities encountered in textile mills which have no humidity control.

FLUCTUATIONS OF HUMIDITY IN TEXTILE MILLS

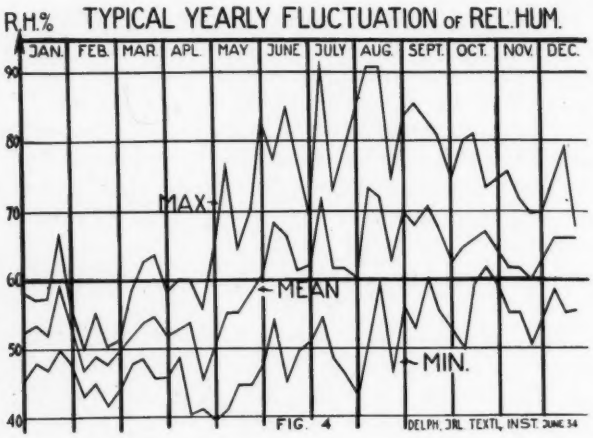
Our service men have made many psychrometric readings in customers' mills. We have found a minimum humidity of 30% in a knitting mill in the Southwest during the winter months and a maximum humidity of 85% in the weave sheds of mills in the Carolinas and in the vicinity of New Bedford, Mass., during the summer months. We know that there is a definite tendency for the mean relative humidities to rise from winter to summer and to fall again from summer to winter. The general level of humidity *from the middle of May to around October 1 is above 60% R.H.* and we usually find it *below 60% R.H. from October to May*. During the summer months the mills are not heated. In mills which do not have humidity control the windows are open most of the time and the humidities inside and outside of the mill are the same and usually over 60%. In winter, even when the outside relative humidity is fairly high, the heating of the cold air drawn into the mill causes a reduction in its relative humidity.

In addition to this natural variation in relative humidity we have another variation which results primarily from an economic factor. It has been difficult in many mills to segregate the weaving of cotton and rayon into separate weave sheds. Cotton weaves better at a relative humidity of at least 75-80% which is too high for the rayons for safe operation.

I will now show you a graph prepared by Delph[2] giving a typical analysis of the fluctuations in humidity in a mill for a period of 12 months (Fig. 4). It shows that the relative humidity of the English mills varies from 40 to 80% throughout the year. Our psychrometric readings indicate that this graph is equally applicable to our American mills.

In winter a probable source of trouble is the fluctuation in humidity due to fluctuations in temperature. If the heating facilities are not operated at night, the marked fall in temperature causes a considerable decrease in relative humidity. This results in "start-up marks" and strained yarn, which results in "shiners" and tight ends in the filling.

A decided change from a high relative humidity to a low relative humidity has been known to wreck warp mills because of the contraction of the yarn. During



the winter months the temperature of the mill should be kept constant day and night.

In order to emphasize the necessity for some degree of humidity control, I will now consider the effects of relative humidity on the physical properties of rayon.

EFFECT OF HUMIDITY ON BREAKING STRENGTH (TENACITY) AND ELONGATION

It is well known that there is a reduction in tenacity or breaking strength and an increase in elongation at higher humidities. When Viscose yarn is wetted thoroughly, it loses approximately 50% of its dry strength while its elongation increases approximately 30%. Acetate loses approximately 40% of its dry strength when wetted thoroughly while its elongation increases approximately 20%.

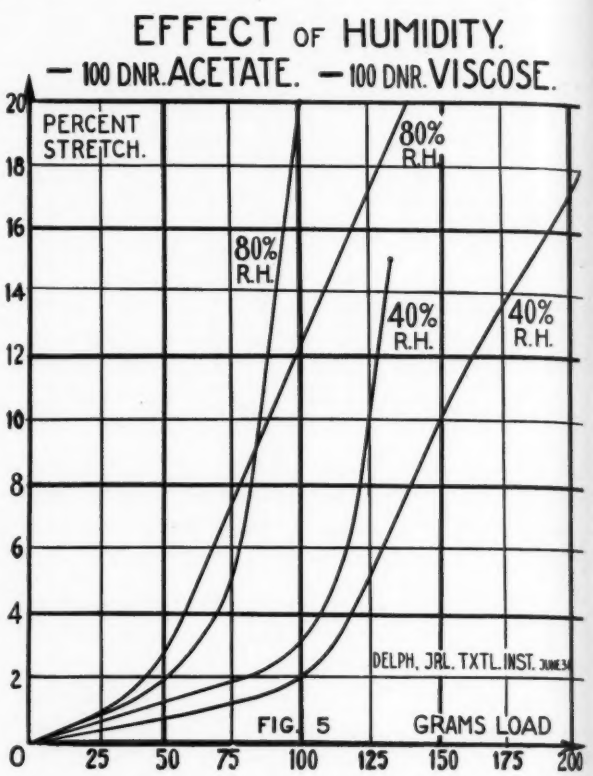
As the relative humidity increases from 40% to 60% (75° F.), cotton was found to actually gain 8.4% in breaking strength while Real Silk and Viscose Process rayon lost 6.8% and 16% respectively.

STRESS STRAIN RELATIONSHIPS

Figures on breaking strength and elongation are of limited value to weavers and knitters because rayons are not worked in the wet state and the tensions employed do not approach those required to break the fiber. More reliable information for mill control purposes can be obtained from the stress strain relationships, i.e., plotting the load in grams as abscissae and the percentage stretch or elongation as ordinates.

This graph (Fig. 5) represents stress strain curves for 100 denier viscose process and acetate rayons. It is my desire that you analyze these curves with me since they vividly show the importance of controlling relative humidity when applying tensions to rayons.

You will note that at 40% R.H. it takes a tension of 75 grams to stretch 100 denier viscose 1%; at 80% R.H. only 35 grams are necessary. At 40% R. H. the "elastic limit" or yield point is reached at a tension of 90 grams while at 80% R.H. it is reached at 35 grams.


EFFECT OF HUMIDITY.
— 100 DNR. ACETATE. — 100 DNR. VISCOSE.
PERCENT STRETCH.
80% R.H.
80% R.H.
40% R.H.
40% R.H.
DELPH. JRL. TXTL. INST. JUNE 34
FIG. 5
GRAMS LOAD
0 25 50 75 100 125 150 175 200
2 4 6 8 10 12 14 16 18 20

Acetate rayon is much less hygroscopic than viscose. In order to stretch 100 denier acetate rayon 1% at 40% R.H., it requires a tension of 46 grams and at 80% R.H. 36 grams. The yield point at 40% R.H. is reached by the application of a tension of 80 grams and at 80% R.H. by a tension of 50 grams. This may be summarized as follows:

		Tension in Grams			
		To Stretch 1%		*To Reach Elastic Limit*	
Process	*Denier*	40% *Gms.*	80% *Gms.*	40% *Gms.*	80% *Gms.*
Viscose	100	75	35	90	35
Acetate	100	46	36	80	50

Interpreting these data in the simplest terms for the processor of rayon we obtain the following:

If the humidity in your weaving or knitting mill is entirely governed by the natural outdoor humidity conditions, then:

In order to prevent stretching viscose process yarn more than 1%, it is necessary for weaving mills to use 50% less grams tension in July and August, than is used in January and February. In the case of acetate yarn, mills must use 20% less grams tension in July and August than is used in January and February. The mill man will say that he cannot reduce his tensions to this

degree without incurring a score of other mechanical difficulties. We hope you will say, "It will then be necessary to give more attention to control of humidity throughout the year and especially during the summer months."

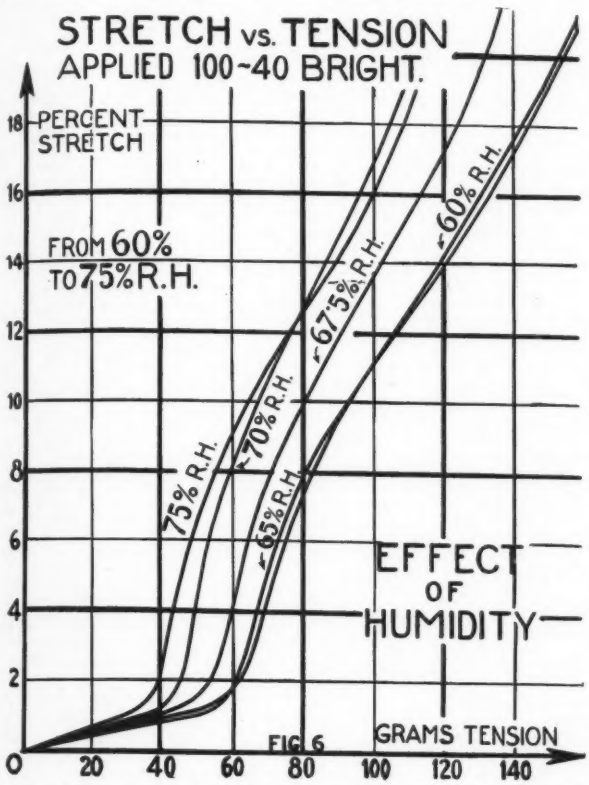


FIG. 6

In the next graph (Fig. 6) we have made a study of the effect of tensions at 60%, 65%, 67½%, 70% and 75% R.H. This is an important and interesting chart. It shows that the elastic limit for 100 denier viscose process rayon is reached at approximately 50 grams at both 60% and 65% relative humidities. It also shows that increasing the R.H. to 67½% (an increase of 2½%) causes the yield point to be reached at 40 grams. This indicates that it is not desirable to process viscose process rayon at a relative humidity higher than 65%. In order that there may be a safety factor for operations, we recommend a maximum relative humidity slightly lower than 65% be used for viscose process rayon. Acetate rayon processes better at a slightly higher humidity than 60% R.H. (60-65% R.H.). Therefore, when processing acetate and viscose rayon together, we cannot exceed 65% relative humidity without jeopardizing the viscose process rayon.

For the dressing or preparatory operations of warping, slashing and copping of viscose process rayon, we recommend an average relative humidity of 55%. This allows an operating safety factor of 10% relative humidity. When viscose process rayon is being woven alone in the weave shed, we suggest that a relative humidity of 60% be used and that the R.H. at 70-75° F. never be allowed to exceed 65%. Viscose process rayon processes well when "lubricated" with a moisture content of 10% to 11%. It is well to keep in mind that viscose rayon has an 11% regain at 55% R.H. which has been suggested as a safe operating humidity in preparatory operations.

I believe these relationships indicate rather conclusively that, insofar as possible, weavers should keep their rayon weaving separate from their cotton weaving, which requires 75% R.H., if they desire to raise the percentage of first grade fabric coming from their looms. We can predict a marked reduction in shiners (bright picks), tight ends, and filling bars resulting from stretched rayon, if this type of segregation is carried out and greater care is exercised in the control of relative humidity. The control of these factors is entirely within the hands of the weaving mills. The dyer can rarely correct errors made in processing in the weaving mill. Much can be done without expenditure of large sums of money for humidifying equipment. Much can be done by carefully considering the layout of mills from the standpoint of isolating processes which greatly increase the humidity. Windows can be kept closed and the heat in the mill can be regulated in such a manner as to greatly assist in preventing wide fluctuations in humidity. The heat regulation can be maintained during the day and night with effective results. A definite man should be assigned to the control of humidity, otherwise no progress will be made. Operators cannot be expected to add this burden to what they already have to do.

THE EFFECT ON DENIER

These graphs (Fig. 7 and Fig. 8) represent stress strain curves of viscose and acetate and show the effect of denier or size of the thread upon the stress strain relationships. The principal points brought out are the following:

1. The maximum permissible tensions for any denier of viscose or acetate is, roughly, directly proportional to the denier.
2. The maximum permissible tension is approximately 2 grams per denier for viscose and acetate rayon at 60-65% R.H.

If one remembers that the maximum permissible tension for 100 denier is in the neighborhood of 50 grams at 60-65% R.H., he can readily calculate the maximum permissible tensions for any denier for control purposes. Figure 9 was drawn up in this manner and can be used as a guide for allowable maximum permissible tensions in weaving and knitting mills when a tensometer is available for measuring tensions.

FILAMENT DENIER

I am indebted to Dr. H. DeWitt Smith[5] of the Tennessee Eastman Corporation for Fig. 10 which graphically

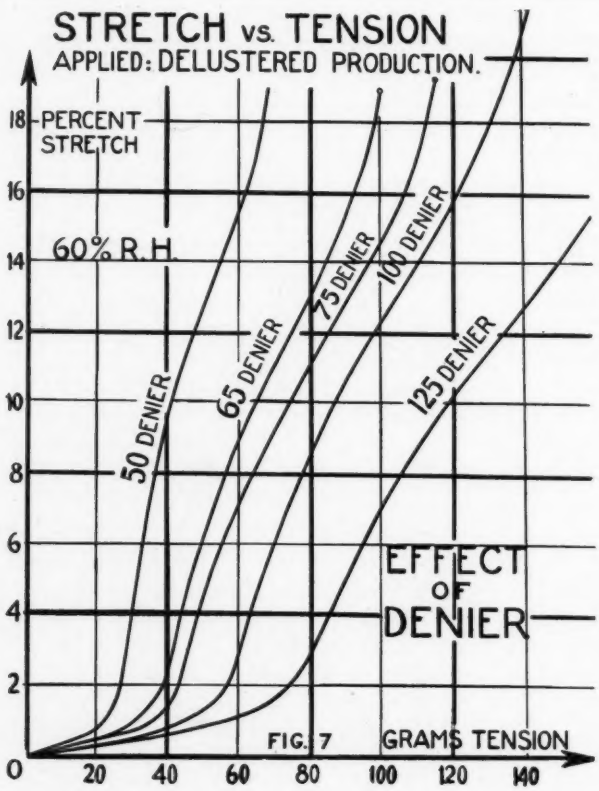


FIG. 7

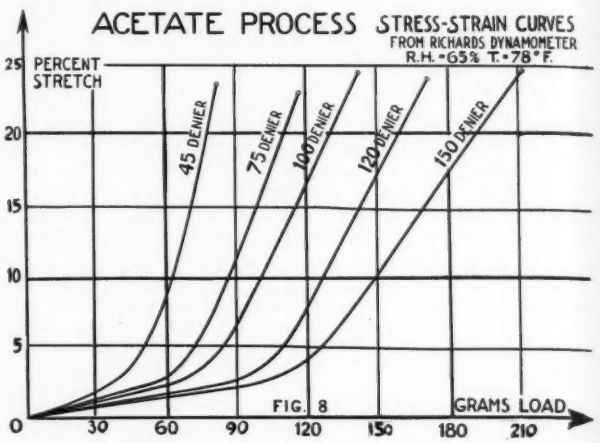


FIG. 8

MAXIMUM PERMISSIBLE TENSION
AT VARIOUS RELATIVE HUMIDITIES.

R.H. %	DENIER 50	75	100	150	200	300	450
60	25	37	50	75	100	150	225
65	25	37	50	75	100	150	225
67.5	20	30	40	60	80	120	180
70	17	26	35	52	70	105	157
75	15	22	30	45	60	90	135

TENSION IN GRAMS

FIG. 9

DIAGRAM OF FILAMENTS.

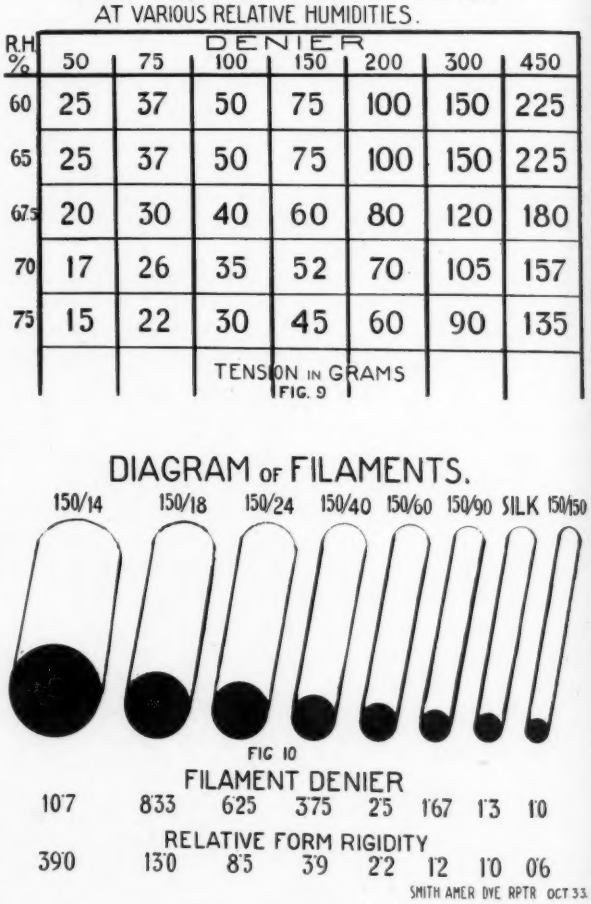


FIG 10

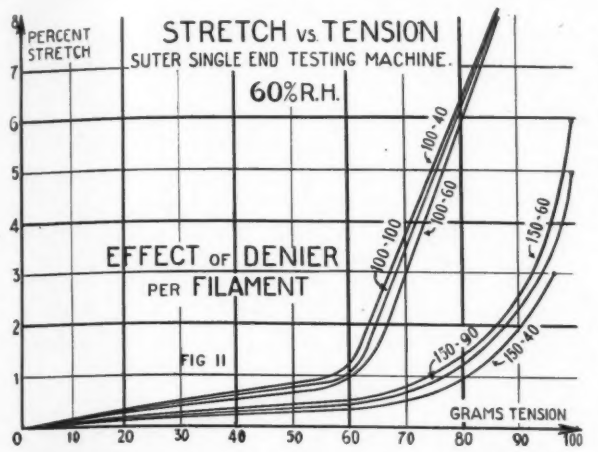
depicts the evolution of filament structure over a period of 25 years and represents the technical progress made in the production of rayon with finer filaments. Twenty-five years ago the denier of a single filament was 10.7 This compares with the denier of a single filament of Japanese silk which after boling-off is 1.3. The technical developments of the rayon producers have now given us rayon yarns having 1 denier per filament.

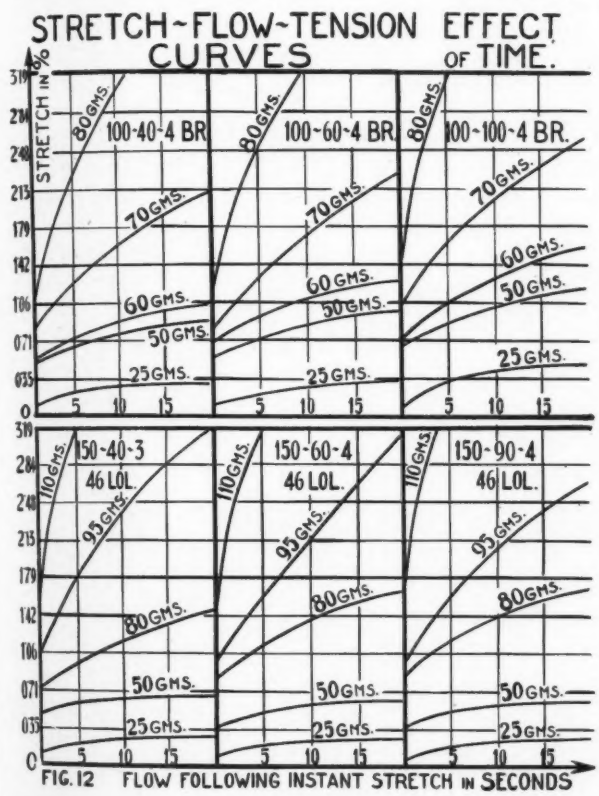
What is the effect of the denier per filament ratio upon the stress strain relationships? Must we use greater care in handling these finer filament yarns?

The next graph (Fig. 11) shows these relationships for 100 denier in the range 2.5 to 1.0 denier per filament and for 150 denier in the range 3.75 to 1.66 denier per filament. It is evident that the denier of the thread is a more important factor than the denier per filament.

Figure 12 shows the difference between the amount of stretch which occurs (1) *the instant the stretch is applied* and (2) the rate at which the yarns continue to stretch as the indicated loads are maintained. These curves indicate the effect of the element of time. Ten of the smaller squares on the flow abscissa are equivalent to five seconds of time. Thus, by noting the difference in stretch brought about between instant stretch and the elongation five seconds later, one obtains an idea of the rate at which the threads are stretching. For example, when comparing the difference between the 100-40 and the 100-100 when using the maximum permissible tension of 50 grams for 100 denier we obtain the following:

(Skip 8 pages)





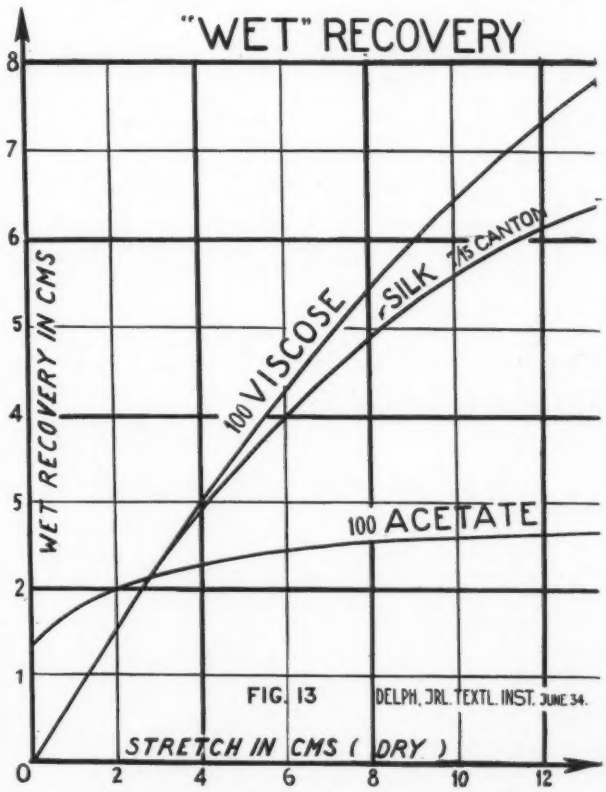
	PER CENT STRETCH			
	At Max. Permissible Tension (50 Grams)		*At Yield Point (80 Grams)*	
	100-40	100-100	100-40	100-100
Instant Stretch %	0.45	0.70	1.06	1.42
After 5 Seconds...	0.60	0.80	2.31	3.19

The finer filament yarns may be handled satisfactorily if the maximum permissible tension for regular yarns is not exceeded. The figures indicate, however, that unreasonable tensions may be expected to cause greater straining of finer filament yarns.

The same tendency for the 150 denier fine filament yarns to stretch more rapidly as the denier per filament is lowered is indicated but the magnitude is less. This again shows the influence of the total denier of the thread in resisting stretch. There is evidence here that the weaving mills and the dyers and finishers must give even more careful consideration to the finer filament yarns in order to prevent overstretching of these yarns.

RECOVERY AFTER STRETCHING

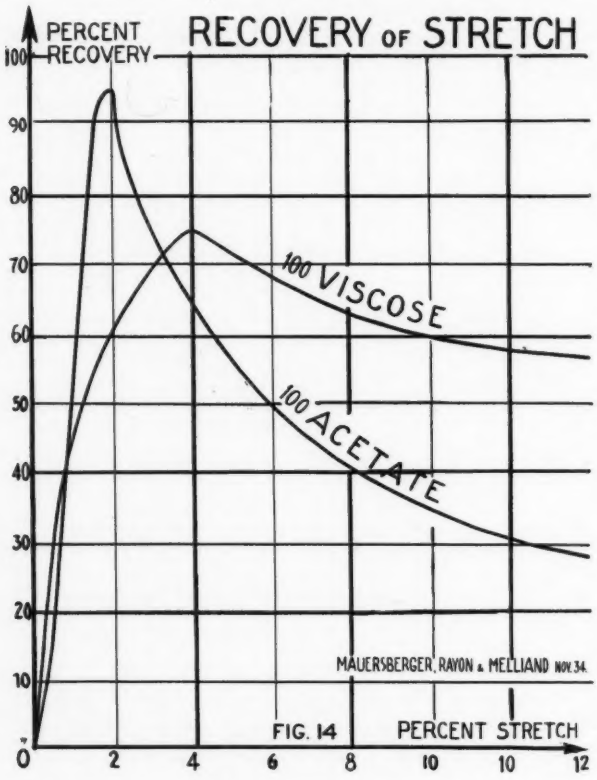
When a yarn is stretched in processing, it is wound on beams, quills, etc., and is given little opportunity to recover from the stretch until it reaches the greige cloth. The recovery in the greige cloth is negligible. When the fabric is wetted out by the dyer and finisher, the strain is released and contraction takes place. Tight picks and strained filling show up at this point in the processing.



The next graph (Fig. 13) shows the relative recoveries from various dry stretches of the following:

(a) 100 denier viscose rayon.
(b) 100 denier acetate rayon.
(c) 7/15 Canton silk degummed.

Figure 13 shows that silk and viscose rayon at the lower stretches have similar powers of recovery and that acetate rayon is more plastic than viscose rayon and silk for stretches of more than 35%.



The next graph (Fig. 14) was plotted by Herbert R. Mauersberger[6] using the figures of Delph[2]. These curves show the percentage of recovery after stretching assuming the rayon threads are free to contract. These curves give a definite indication why the fullness and coverage of fabrics can be vitally affected by overstretching, especially in the sizing operations in the weaving mills or in the dyeing and finishing operations.

Acknowledgment is made to Dr. A. Stuart Hunter for the preparation of many of the graphs and helpful suggestions.

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[2]Delph, A. E., Jrl. Text. Inst., Vol. 25, p. 252 (1934).
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[4]Sheppard and Newsome, Indus. and Eng. Chem., Vol. 26, p. 285 (1934).
[5]Smith, H. D., Amer. Dye. Rptr., Vol. 22, p. 610 (1933).
[6]Mauersberger, H. R., Rayon and Mell. Text. Monthly, Vol. 15, p. 33 (1934).

President Rose: I am sure that all of us realize better, after what Dr. Quig has told us, how important it is to control all kinds of physical conditions, and the lesson, I think, will be useful to us.

The next speaker on the program is Mr. Ernest H. Benzing, of the American Bemberg Corporation.

Mr. Benzing! (Applause.)

Causes of Faults Encountered in

Regenerated Cellulose Fabrics*

By **ERNEST H. BENZING**
American Bemberg Corp.

THEY can be divided into two major groups:

1. Fabrics that are customarily handled on jig and pad,
2. Fabrics that are customarily handled on the winch.

FAULTS ENCOUNTERED IN FABRICS HANDLED ON JIG AND PAD

1. *Warp Streaks*—Causes:

1st—The rayon itself.

2nd—Manner in which the synthetic yarn is handled.

Generally the method of reducing or minimizing them is the mechanical treatment of the fabric, which depends entirely on the nature of the cloth. The methods for dyeing and finishing fine filament yarn differ somewhat from those generally used for other synthetic yarns. The preliminary treatment must not only cleanse the yarn from sizing and other matter contracted in weaving, but above all must produce a uniform swelling of the fibers. The preliminary treatment in a boiling bath is always best. A water corrector is added to the scouring bath, which may consist of soap or some of the sulfonated fatty alcohols. This prevents the separation of insoluble soap. A drying between scouring and dyeing also helps in minimizing warp streaks. Another way would be to select dyestuffs that do not show the streaks as pronounced.

Warp Streaks Can Be Overcome by:

(1) Improvement of the yarn.

In this direction I know a tremendous amount of research is carried out by the synthetic yarn manufacturers,

*Presented at Annual Meeting, Dec. 7, 1934.

and tremendous sums of money have been spent for improved equipments, and synthetic yarns have been improved tremendously during the past few years.

(2nd) Improved methods of handling during weaving and converting operations.

It is a known fact that fabrics woven in some mills are far superior to those woven in other mills, relative to warp streaks, the difference being due to careful handling throughout the plant. Special attention must be given to controlled humidity and tension. When lining cloth is scoured in open form, dried loose, dyed on the pad (running the machine fast), definitely avoiding dry cans, and dried on the frame, it is possible to produce lining cloth practically free from warp streaks. The same fabric, if treated in the normal manner, might show an extreme warp streak condition.

None of these facts is new to you men, who have handled synthetic yarn in any quantity, none is new to those responsible for sending out grey goods to be dyed, nor is it new that by paying the extra premium it is possible to obtain dyeing of this type from any qualified commercial dyer. However, it would indeed be news if those responsible for having the fabric dyed, suddenly became willing to pay the extra premium. We dyers *can* by observing proper procedure, using proper dyestuffs, etc., go a long way toward overcoming defects caused by uneven tension applied during fabric manufacturing operations. However, we cannot do this unless we are paid costs plus a normal profit.

In this connection we can mention only roughly some causes of unevenness by improper handling in the mill:

1. Set marks.
2. Shiners due to uncontrolled humidity.
3. Creases.
4. Tear drops due to improper sizing.
5. Variation in shade from piece to piece, due primarily to variations in slashing caused sometimes by mixing yarns from different manufacturers.
6. Two distinct causes of improper handling:
   a. Improper boil-off.
   b. Improper finishing due to lack of equipment.

FAULTS USUALLY ENCOUNTERED IN FABRICS HANDLED ON THE WINCH

Pebble Variations. In most cases, after many trials, the dyer simply stated that the troubles are due to the construction and nature of the yarn, without going any further into the actual cause and possible cure. Unfortunately, from the view point of both, dyer and weaver, excessive dye troubles have detracted considerably from the value of fabrics. The throwster was in most cases blamed for the trouble by the dyer, he being of the opinion that uneven twist, etc., was the true cause of the fault. After checking into many such fabrics, the throwsters convinced themselves that these yarns were relatively uniform with respect to twist, count, etc. Throwsters then passed the trouble back to the designer, stating that the nature of the fabric was such that it could not be produced uniformly. I have seen dyers making a salable piece of goods by overcoming troubles caused in throwing. A great deal of work, time, and large sums of money have been spent by yarn manufacturers for preparations for soaking before twisting, and it has been proven that each soaking preparation produces a different degree of pebble on each of the viscose type yarns. It is, however, possible to obtain the same pebble or vary the pebble by changing the formula of the soaking bath used before twisting. The yarn manufacturers would gladly assist in any way possible in achieving the desired results. As it is necessary to change the soaking formula for the various yarns of the same process in order to obtain the best results, it is necessary to change the formula for crepes with an acetate warp and crepes with viscose warps or Bemberg warps.

Cracks and breaks in fabrics have largely been overcome in converting by embossing before dyeing. In this way more uniform results were obtained on fabrics which ordinarily might have been cracked due to the following causes:

1. Excess stretch on warp.
2. Relation of the warp size against the filling.
3. Preventing the yarn from creping due to stretching it over its elongation point.
4. Not steaming dry to set the twist after spinning.
5. Uneven creping due to improper soaking.

Although the constituents of the soaking bath are nearly always the same regardless of the type or brand of synthetic yarn being prepared, it must be kept in mind that each type and brand has its own characteristics which require some changes in the preparation. Thus, for example, any type of crepe can be produced with Bemberg.

PRINTING

There are no difficulties in connection with the printing of fabrics made from fine filament yarn. It must only be remembered that the goods should not be dried at a very high temperature after printing, and that they should be washed immediately after steaming. Otherwise the printing gum will dry up and the separating and crystallizing constituents may cut the fibers. If this happens, the material will become brittle when it is washed. For this reason a cooling zone is constructed in the drying chamber through which the goods are passed after printing so that they are not dried to a great extent, but leave the drying chamber well cooled off. This cooling equipment is not necessary if the working speed of the machine is regulated so that the goods do not dry too much. After having been treated in the drying chamber, the goods should be rolled up instead of folded in order to prevent creases. The pieces must then be steamed immediately. The steaming, the details of which depend entirely on the particular printing process used, should be carried out in

the same manner as for cotton or synthetic yarns of other makes.

In conclusion, I want to point out that most synthetic yarn manufacturers maintain a service department, ready to assist in obtaining the best results on their particular brands.

Each particular brand of synthetic yarn has its own peculiarity which must be borne in mind in attempting to obtain the best results. On the other hand, it is our intention to simplify the handling and to develop a method applicable to all brands especially in all pretreatment before dyeing, printing, and finishing.

President Rose: We have one more speaker on the subject of rayon, Dr. H. D. W. Smith of the A. M. Tenney Associates. I will call on Dr. Smith. (Applause.)

Defects in Crepe Fabrics*

By HAROLD DE WITT SMITH, Ch.E., Ph.D., F.T.I.
Textile Technologist, A. M. Tenney Associates, Inc.

THE great bulk of crepe fabrics containing viscose rayon or acetate yarn are made with a dull luster warp. This may be of viscose or acetate type. The fabrics of finer pebble have a filling of silk or of cuprammonium yarn crepe twisted. The greatest volume, however, are filled with crepe twist viscose rayon in 100, 150 or 200 denier depending upon the rib and pebble desired. Considerable quantities of spun rayon in equivalent sizes are also used.

You undoubtedly know, as well as I do, that the principal defects of such fabrics are only revealed after the fabrics are dyed and finished. These defects fall into a few categories principally:

Pebble Defects—Width and pebble variation, breaks or cracks.

Dyeing Defects—Uneven dyeing which may appear as irregular stains or blotches, or as filling bars or warp streaks.

Mechanical Defects—Tenderness and fuzziness.

The time allotted to me is so brief that an adequate discussion of all these faults is impossible. I shall touch but lightly on the nature of the principal troubles and shall attempt to focus your attention on the need for a concerted attack upon them.

Pebble defects are usually filling defects. They may originate with a designer who has made an error in construction. They may go back very often to a throwster who has given insufficient attention to the factors of moisture and tension which have been discussed by Dr. Quig. They may be due to a weaver who has neglected these same factors in copping the yarn and in weaving it, or who may occasionally load the warp with a size which is too slowly removed and so absorbs the creping power of the filling in the boil-off vats before it can draw the softening warp ends into the desired pebble. Finally, they may be due to your own handling of the fabrics in a finishing plant, perhaps stick marks, perhaps too sudden a shrinkage, perhaps insufficient removal of the size. This is a subject for a book, or for an evening at least.

DYE DEFECTS

There are dye streaks due to variations in the yarn. They are rarer now than a few years ago because of the precision control which the rayon manufacturer has evolved and applied to every step of his process. There are streaks which appear to be due to a variation inherent in the yarn, but which are due to tension variations in the greige mill which affect the subsequent behavior of the yarn in dyeing. There are streaks which are due to faulty selection of dyestuffs or to faulty treatment in boil-off or in dye bath. There are blotches caused by sizes and by throwing oils which have ingredients that "break" out of their emulsions and fasten themselves in resist spots upon the fabric.

MECHANICAL DEFECTS

Filaments may be broken in the yarn plant or in subsequent stages of processing with consequent fuzziness and perhaps tenderness of the finished fabric. The embossing machine is a potential source of great danger in tendering if it is not carefully handled.

So much for the defects themselves. They are popularly known as "headaches."

Shall we all cooperate to solve these troubles or give up the task as too difficult? I would ask you to consider a few pertinent facts:

First—If there is one thing certain in this textile world of ours it is that *the man-made fibers are here to stay*. Whether they be made by the viscose, cuprammonium and acetate processes as at present, or by the nitrocellulose

*Presented at Annual Meeting, Dec. 7, 1934.

process, which seems to have passed into history or by processes yet unborn, there is no choice left to the throwster, the weaver, the knitter, and the finisher or dress and decorative fabrics.

If each would stay in business he *must* handle successfully the rayon and synthetic fibers which are being made today and those which will be made in the future.

Second—High quality in fabrics created with these fibers can be attained because it *is* being attained today and every day. These fabrics are on the models of exclusive couturiers. They are in the better stores and shops. They come from the spindles of the progressive throwsters, from the looms of the finer weavers and from the dye vats of the modern finisher.

Third—If some fabrics can be made right, *all can be made right* by rigid control of the conditions at each stage. The yarn producer has had to adopt and to devise scientific methods of precision control, and the result is a product which for all its faults is *more uniform than any of the natural textile fibers.*

This same degree of precision manufacture must be applied by the throwster, the knitter, the weaver and the finisher in order to meet the standards of the trade.

A single example to illustrate my point: In the course of my work I have had the privilege of seeing a number of finishing plants and my contacts with you men in these plants have been of great benefit to us, and I hope not entirely unfruitful to you. But this week for the first time in the twelve years during which I have been in contact with the finishing industry I saw two dye jigs which were actually equipped with *recording thermometers.* That there may be others I do not doubt, but I know they are a rarity. In contrast to this, I know from personal observation that our own yarn plant is equipped with a recording gauge at *every point* where *temperature, pressure,* or *humidity* is of any importance in the manufacturing operations and these factors can, therefore, be actually held within the rigid limits which we know we must observe in order to produce a uniformly satisfactory product.

Many of the common defects which I have mentioned are not easily traced to a given cause. The yarn may be at fault, or the preparation for weaving, or the weaving or the processing by the finisher or perhaps a latent defect produced by one of these may develop in a subsequent step. None of us can afford to pass the buck.

A clever firm may temporarily sidestep some responsibilities which are difficult to trace to their true cause, and even some which are clearly its own. But such a policy is disastrous not only from a moral but from a hard-headed business point of view. I think it is passing rapidly because those who practice it cannot survive against those who are acting according to the facts. Every complaint offers a chance to learn more about these man-made textiles. When we consider the generations of work and of testing by trial and error which have been spent in slowly building up the present ability to handle the natural fibers, which still present many difficulties,—the accomplishments in this new field are the more remarkable. The yarn manufacturer is using *all* the tools of modern science and *all* the knowledge he can gain to make his product right. He asks that you who handle the yarn from winding and throwing through to the finished fabric shall do the same. I know I can speak for my own principals and I believe that every yarn producer will join me by pledging full cooperation in every effort to find the facts behind each complaint and to act upon them. Such a course will provide each of us who makes or processes these new textile products with more knowledge upon which to base successful operations.

President Rose: These very valuable papers should be discussed, but there is no time, unfortunately, in which to discuss them. Therefore, I recommend that you get in touch with these gentlemen individually if you want to talk over the very interesting aspects of the use of artificial fibers which they have brought to your attention.

Before we pass to the next item on our program, I wish to make an announcement which I have been asked to make, and that is that those interested in the development of natural silk have refused the suggestion that they use a trademark, a dead Bombyx mori, with a statement, "He did no research." (Laughter.)

The developments in modern chemistry have been extraordinarily varied, as we all know, and it does us good to get out of our field and see what is being done in other fields. It is, therefore, with very great pleasure that I go to the next item on the program, "The Commercial Extraction of Bromine from Sea Water," by Leroy C. Stewart of the Dow Chemical Company.

However, before that starts, I should like to point out to you that immediately following this portion of our program, if you will adjourn to the room in which we had our supper, you will be in a place where there will be the most delightful entertainment, and you will have a chance to mix very informally among each other. If I can get Mr. Herrmann—he has had so much to do with this program—I want him to come up here and tell you in a moment what he has in store for you. I merely wish to say that he is the man who is responsible for the excellence of this program, and I want him, if it is possible to do so, to tell us a little of the glories that are in store for us, so that we may adjourn to the other room after the next item on our program.

Mr. Henry F. Herrmann: Gentlemen, I am very happy at this large turnout here tonight. I have only one regret and that is that we weren't quite prepared for you. Possibly I am exaggerating this in my own mind, but I felt rather badly when I saw so many people who weren't really properly cared for out at our buffet. The manage-

ment joins me in this regret, and they say that in order to compensate for it, they are going to help us put on the biggest show that the hotel has ever seen.

. . . Mr. Herrmann then made some announcements . . . (Applause.)

President Rose: I have been asked to tell you that this publication by the Rayon Sub-Committee is available to you. You can pick it up as you leave this room.

We will now proceed to the next item on the program, "The Commercial Extraction of Bromine from Sea Water," by Mr. Leroy C. Stewart of the Dow Chemical Company. (Applause.)

(*This paper will appear in a future issue of the* REPORTER)

MEETING, THE PIEDMONT SECTION

THE annual meeting of the Piedmont Section of the American Association of Textile Chemists and Colorists was held in the Charlotte Hotel, Charlotte, N. C., on Saturday evening, Nov. 10th.

There was no afternoon session, thereby allowing the members and their friends interested in football to attend the Davidson and North Carolina University game at Davidson, N. C., about 20 miles from Charlotte.

A banquet was held in the evening where 195 members and friends sat down to enjoy the delightful meal prepared for them.

During the banquet an entertainment provided by the local committee was enjoyed by all.

A very interesting paper on "Factors involved in the reducing action of Sulfon Cyanine Black in the one bath method of dyeing", presented by Mr. Graham Cook of Bick & Co., Reading, Pa. was followed by a very interesting paper by Dr. James G. Vail, Chemical Director of the Philadelphia Quartz Co., Philadelphia, Penn. The title of his paper was "Silicates of Soda."

The following new officers for the coming year were elected:

Paul Haddock, Chairman, P. O. Box 1888, Charlotte, N. C.

T. R. Smith, Secretary, Piedmont Processing Co., Belmont, N. C.

Chester Eddy, Vice-Chairman, Renfrew Bleachery, Travelers Rest, S. C.

Wilbur Suthers, Treas., Proximity Print Works, Greensboro, N. C.

Respectfully submitted,

JOHN C. ROBERTSON, *Secretary.*

APPLICANTS FOR MEMBERSHIP

Active

William Croasdale—Dyehouse Foreman, Bradford Dyeing Association, U. S. A., Bradford, R. I. Sponsors: J. A. Pawson, Wm. F. Brosnan.

William J. Daly—Foreman, United States Finishing Co., Providence, R. I. Sponsors: Raymond A. Pingree, Wm. H. Cady.

John F. Shea—Textile Chemist, Buffalo Electro Chemical Co., Inc., Buffalo, N. Y. Sponsors: Roland E. Derby, Edward B. Bell.

William E. Small—Chemist, American Aniline Products Inc., Boston, Mass. Sponsors: John C. Tebbetts. Roland E. Derby.

Junior

Arthur Hustwit—Dyer, Bradford Dyeing Association, U. S. A., Bradford, R. L. Sponsors: J. A. Pawson, Wm. F. Brosnan.

William B. Tucker—Salesman, Proctor & Gamble Dist. Co., 205 E. 42nd St., New York, N. Y. Sponsors: P. J. Kennedy, L. J. Roos.

Harry M. Hartnett—Salesman, General Dyestuff Corporation, Boston, Mass. Sponsors: Roland E. Derby, John F. Bannan.

Arthur Spalding—Chemist, Hockanum Mills, Rockville, Conn. Sponsors: Roland E. Derby, John F. Bannan.

Proceedings of the American Association of Textile Chemists and Colorists

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive

Note. Persons who have obtained employment should notify the secretary at once. Prospective employers may file vacancies either with the secretary or the American Dyestuff Reporter.

A-3

Education—Ph.B., Brown University, 1920. Two years post-graduate work at M.I.T.

Experience—2 years instructor at M.I.T. 2 years as research chemist in print works (Gum thickenings, application of dyes, dye testing and evaluation. 4 years as chief chemist in bleaching, mercerizing, dyeing and finishihng plant. 4½ years as research and plant chemist in silk mills (Colorimetric work in color matching, dye testing and identification and testing of chemicals). 2 years as organic research chemist (laboratory and semi-plant research on organic chemicals, intermediates and dyestuffs). Age 35, married. Will go anywhere, references.

A-5

Education—B.T.C., Lowell Textile Institute.

Experience—Assistant chemist in carpet mill, dye tester in dye plant, research and analytical work in silk dyeing and finishing plant laboratory, plant chemist and overseer of bleaching in surgical dressing plant, assistant chemist in woolen mill. Age 29. Married.

A-B-2

Education—Lowell Evening Textile School, 1917.

Experience—Five years' experience in hosiery dyeing, full fashioned hosiery of silk and cotton and silk, also men's hosiery containing rayon, wool, cotton and celanese. Several years experience in laboratory work. Has also had experience in jig-dyeing of cotton piece goods, slub and top dyeing.

A-B-3

Education—1 year Conn. Agricultural College, Extension course in chemistry at Trinity College and R. I. School of Design.

Experience—3 years laboratory research on guaranteed washfast and sunfast colors on silk, cotton and rayon. 2 years dyer on skeins (all fibers and all types of dyeing). 1½ years as dyer in charge of adapting vat and naphtol colors to machine processes for cotton threads. 1 year as chemist and dyer on narrow fabrics. Will go anywhere; references.

A-B-C-1

Education—Graduate Industrial Chemical Engineer, Pratt Institute—1911.

Experience—One year as plant control chemist, 4 years as laboratory chemist with gas company, 13 years as plant chemist with bleaching, dyeing and finishing plant. (Rayon and cotton piece goods). Formulated processes and put them into plant operation, 1 year as chemist and demonstrator for dyestuff company, 1 year as superintendent colorist with print works printing linen and rayon, 1 year as director of testing laboratory for national dry goods concern.

A-B-C-2

Education—Graduate of Lewis Institute of Engineering of Chicago and graduate of Philadelphia Textile School (Chemistry and Dyeing department).

Experience—Has had extensive experience as assistant chemist and colorist in silk printing, dyeing and finishing; also dyeing raw stock wool; and dyeing and finishing cotton and rayon. Age 30; married; references.

A-B-D-1

Education—Graduate, New Bedford High School, 1930; New Bedford Textile School, 1933 (chemistry, dyeing and finishing).

Experience—16 months' general experience in print works, on all type machines and special experience in application of direct, sulfur, developed and naphtol dyes and color matching. Desires position in dyehouse, laboratory or sales. Age 22; references.

A-E-1

Education—Ph.D., Univ. of Illinois, studied chemical engineering at Columbia, licensed chemical engineer, New Jersey.

Experience—10 years' experience teaching in colleges. subjects included chemical and textile subjects. Has had broad experience in industrial work including experience in testing materials, research and consulting. Will go anywhere; references.

B-1

Education—Educated and trained in chemistry and calico printing in Glasgow, Scotland.

Experience—Has been with large print works as colorist for 13 years producing first class work on cotton, rayon, wool and silk fabrics. References.

B-2

Experience—Boss dyer with one firm for 18 years, divisional supt. at print works for 1 year, in charge of processing and dyeing of cottons and rayons at large bleachery for 6 years. Prefers bleachery in East but will go anywhere. References.

B-3

Experience—Foreman piece dyer for the past 21 years. Can dye the following; celanese, rayon, cotton lacks, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work.

B-6

Education—Graduate R. I. School of Design.

Experience—5 years in bleachery, 7½ years as assistant dyer, 2 years as boss dyer and 3 years as superintendent of dyeing and finishing. Married, 33 years old. References.

B-7

Experience—Eight years as boss dyer on skeins and ribbons. Over ten years as chemist and head dyer for a large hosiery mill. Experienced on Silk, cotton, rayon and wool in skeins, ribbons, piece goods and all kinds of mixtures. Willing to go anywhere. Not afraid to work or face responsibility. Can handle help efficiently.

B-8

Education—Chemistry and Dyeing Department, Philadelphia Textile School.

Experience—Eleven years experience as chemist and boss dyer on the following: woolen, worsted and cotton yarn; woolen, worsted and union piece dyes on both ladies' and men's wear; wool, cotton, shoddy and mohair raw stock. Age 33, married, will go anywhere. References.

B-9

Experience—Hosiery dyer with fifteen years' experience on high grade silk hosiery; familiar with all types of machines. Age 43, married. Will go anywhere.

B-12

Education—2 years days at N. Y. U. and 3 years nights studying chemical engineering.

Experience—1½ years asst. colorist, 5½ years colorist. Experienced on vats, commercial and fast colors on cotton and cotton-rayon mixtures. References; age 29; married.

B-13

Experience—Large experience as an assistant colorist chemist in silk printing, dyeing and finishing; also on cotton and wool dyeing. References.

B-14

Education—Rhode Island School of Design.

Experience—Familiar with all classes of wool dyeing. Seven years with large carpet mill as dyer and processor of washed oriental rugs. Will go anywhere, married, 37 years old. References.

B-15

Education—B.T.C., Lowell Textile Institute, 1934.

Experience—Experience in dye house running washers, dye kettles and as a dye weighter.

F-1

Education—Textile Institute, Alexander Hamilton Inst., Extension work at Brown Univ., working knowledge of German.

Experience—Has had executive departmental work with all types of textiles manufacturers. Acquainted with all types of textile machinery, dyestuff application, laboratory practice, cost methods, and checking methods and processes. References.

CALENDAR OF COMING EVENTS:

Meeting, Philadelphia Section, Broadwood Hotel, Philadelphia, January 11th.

Meeting, New York Section, Chemists' Club, New York City, January 25th.

Council and Research Committee Meetings, Friday afternoon, January 25th, Providence Engineering Society, 195 Angell Street, Providence, R. I.

Meeting, Rhode Island Section, Friday evening, January 25th, Providence Engineeering Society, 195 Angell Street, Providence, R. I. President Robert E. Rose will speak.

AMERICAN
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REPORTER

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Vol. XXIII December 31, 1934 No. 27

• THE TEXTILE FOUNDATION

At a meeting of the Directors of the Textile Foundation held in Washington, December 10, it was decided to continue the program of scientific research on problems related to the textile industry and the production of textile fibers for another year.

Although in many cases the title does not adequately describe the scope of their undertaking or the specific approach to certain research aspects, the following list of fellows indicates the nature of their work and where it is being carried on.

John B. Calkin, Cornell University, Adsorption and Absorption of Solutions by Textile Materials; Maxwelton S. Campbell, University of North Carolina, Disposal and Recovery of Textile Wastes; A. J. Frantz, Lehigh University, Effect of Bacteria and Vegetable Oils on Silk; Mearl A. Kise, Yale University, Fundamental Study of Silk; Donald R. Morey, Cornell University, Application of Polarized Light to Textile Research; Robert D. Nutting, Massachusetts Institute of Technology, Application of the Spectrophotometer in Solution of Textile Problems; John S. Reese IV, Massachusetts Institute of Technology, Quantitative Method for Describing the Rate of Exhaust in Continuous Dyeing; Donovan J. Salley, Princeton University, Protective Effects in Textile Deterioration and Dye Fastness; Wayne A. Sisson, University of Illinois, X-Ray Analysis of Fiber; Werner Bergmann, Yale University, Bio-chemical Research of Silk; and, Bryce Prindle, Massachusetts Institute of Technology, Microbiology of Textile Fibers.

Progress reports are periodically received from the fellows, and are published in "Textile Research," the monthly bulletin of the United States Institute for Textile Research, Boston, Mass. Reprints of most of the reports are available on application to the Foundation.

The Director received progress reports on several studies now under way, including the following subjects

1. The Training of Men for the Textile Industries.
2. Flax Production, Preparation and Utilization.
3. Regional Variety Tests on Cotton Production.

The educational study has received whole-hearted support from the textile school heads, who have developed a program of semi-annual conferences for the purpose of adapting textile educational courses and practices to meet changing demands.

Flax was planted in fifteen different localities principally along the Atlantic seaboard. Careful records were made of the harvest and production costs. The straw was then shipped to Clemson College, S. C., where, under the direction of H. H. Willis, it was run through preparatory machines. Experiments are now being conducted on the utilization of this fiber on cotton and worsted machinery, and for paper making.

The experiments on the community production of limited type cotton were conducted over the cotton belt, under the auspices of the Bureau of Plant Industry of the Department of Agriculture, and an analysis of the results is now being made.

A proposal to engage in research on the warp sizing of cotton and synthetic fiber yarns was acted on favorably, and a cooperative program of work will soon be started under the auspices of the United States Institute for Textile Research.

The office of the Textile Foundation is located in the Commerce Building, Washington, D. C., and the Directors are: Franklin W. Hobbs, Chairman; Stuart W. Cramer, Treasurer; Henry A. Wallace, Secretary of Agriculture; Daniel C. Roper, Secretary of Commerce; Frank D. Cheney, and Edward T. Pickard, Secretary.

• ANNUAL MEETING, S.O.C.M.A.

The Thirteenth Annual Meeting of the Synthetic Organic Chemical Manufacturers was held at the Chemists' Club, New York City on Thursday, December 6th. President Merz was presiding.

The reports of the various officers and committees were heard. The officers elected for 1935 are as follows: President—August Merz, Calco Chemical Co., 1st Vice-President—E. G. Robinson, E. I. duPont de Nemours & Co., 2nd Vice-President—F. G. Zinsser, Zinsser & Co., Additional Board Members—E. A. Barnett, John Campbell & Co., R. E. Dorland, Dow Chemical Co., G.

Lee Camp, Monsanto Chemical Co., and A. L. van Ameringen, vanAmeringen-Haebler, Inc.

A dinner was served to the members and guests at 7:00 P.M. in the main dining-room. At this dinner three pioneers in the movement to develop the chemical industry of this country were specially honored. These three men were Francis P. Garvan, Charles H. Herty and Morris R. Poucher. They were each presented with a plaque by Irenee duPont, who acted as master of ceremonies. The following inscription was placed on each plaque: "In recognition of the outstanding services contributed by him to the development of the chemical industry in the United States this testimonial of appreciation is awarded to.....by the members of the Synthetic Organic Chemical Manufacturers Association of the United States, December 6, 1934." Each of the three gentlemen responded very ably, Mr. Garvan expressing the great pleasure he derives from his work, Dr. Herty speaking of his recent work in the production of rayon from Southern slash pine sulfite, and Mr. Poucher giving an historical outline of the chemical industry in this country.

Franklin W. Hobbs also spoke briefly upon his early recognition as a textile manufacturer of the importance of American Chemical independence.

● PERKIN MEDAL AWARD

The Perkin Medal of the Society of Chemical Industry is to be presented to Dr. George O. Curme, Jr., of the Carbide and Carbon Chemicals Corp. on Friday evening, January 11th. The presentation will be the feature of a joint meeting of the Society of Chemical Industry, the American Chemical Society, the Electrochemical Society and the Societe de Chimie Industrielle to be held that evening at 7:30 o'clock at The Chemists' Club, 52 East 41st Street, New York City. The award has been made in recognition of Dr. Curme's work in the field of synthetic organic chemistry. This branch of the chemical industry will be discussed by Dr. Curme in his Medal Address, which is entitled "Industry's Toolmaker." Prior to the meeting a dinner will be held at The Chemists' Club at 6:30 o'clock.

● WATER

As an Engineering and Industrial Material

The A.S.T.M. Edgar Marburg Lecture for 1934 delivered on the above subject by Sheppard T. Powell, Consulting Chemical Engineer, has been published in pamphlet form by the Society. The lecture is of particular value to those concerned with industrial applications, power plants, water analysis and detection of impurities, but it is also pertinent to the general water supply field.

There is presented current thought on such problems as the following: Removal of suspended solids from water, effect of color on industrial water supplies and detrimental effect and removal of manganese. A considerable portion of the lecture discusses the treatment of water for use in boilers. The application of petrographic examination of boiler scales is indicated and the characteristic properties of minerals are described.

The section on influence of concentrated boiler-water salines on cracking of boiler steel and prevention of caustic embrittlement is important in view of the failure of many boilers from this cause.

Also discussed are the corrosion of iron and steel in steam generating systems and the reduction of corrosion losses by deaeration of water. The discovery by spectrographic analysis of lead, fluorides, zinc, and other metals in appreciable amounts in municipal water supplies is evaluated. The lecture points out that "Such compounds, even though present in very small quantities may have a far-reaching effect in special cases."

Copies of the published lecture, aggregating 45 pages, can be obtained from A.S.T.M. Headquarters, 260 S. Broad Street, Philadelphia, at 50 cents each.

● TORNESIT

1934 marked the evolution of Tornesit from an experimental to a commercial product. Tornesit is a chlorinated rubber base, from which can be formulated paints, emulsions, binders, adhesives, and plastics, with remarkable chemical resistance. It was developed by chemists of the Hercules Powder Co., who consider it one of the most important new materials in the protective-coating industry since the discovery of nitrocellulose as a base for lacquers. Hercules' new plant for the manufacture of Tornesit in this country is nearing completion at Parlin, New Jersey.

Tornesit is said to have demonstrated its great resistance to acids, alkalies, and the many other corrosive elements that are destructive to protective coatings.

● FILTRATIONS IN CHEMICAL LABORATORIES

The above is the title of a booklet for the chemist recently published by Carl Schleicher & Schull Co. This is a handbook on all filtering operations of interest to a chemist. There is also an appendix on large-scale production filtrations in manufacturing plants. It contains 136 pages and copies are available upon request.

● FIRSTS IN AMERICA

The above is the title of an attractively bound volume published by the North American Rayon Corp. in commemoration of the recent completion of their enlarged plant at Elizabethton, Tennessee. It presents interesting notes as to significant initial industrial and commercial developments in this country, beginning with the first automobile in 1866 and concluding with the statement that the first wire-rope factory was erected in 1841. A brief history of the company since the time of its inception in 1927 is also traced.

ABSORPTION OF WEAR

(Continued from page 716)

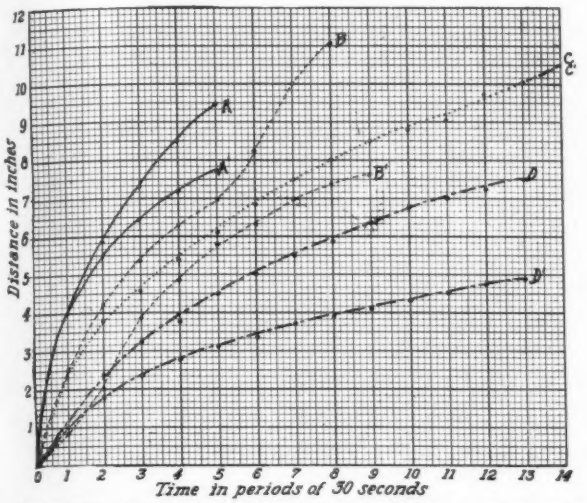

Chart 2—Curves showing the effect of variations in technique on the absorption of moisture by Haven's method.

of fabric were used for one test. The ends of these were placed simultaneously in the water and the position of the absorption line on the cloth was recorded on the graph paper at periods of 30 seconds.

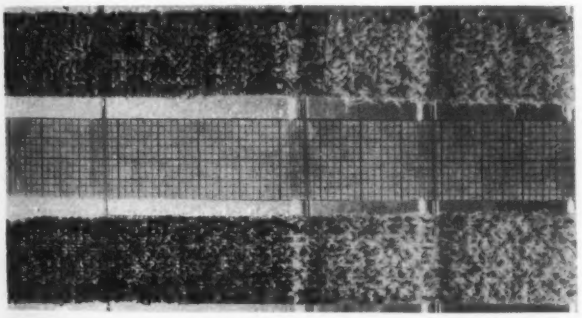

Fig. 3—Close up of specimen showing the distinctness with which the absorption lines can be seen.

Tests were made with the table top in a vertical position. In this position water rose only about 3 inches in the fabric. Points in this short distance were too close together to show accurately the rate of absorption. The vertical position was not used further. With the table top in the horizontal position water traveled to about 10 inches and moved more rapidly, thus separating the points.

Apparatus necessary for this method of testing is inexpensive and easily constructed. Approximately 45 minutes is sufficient time for one test. However, constant relative humidity and temperature are essential during test as they were found to be important factors in the rate of absorption.

The suitability and accuracy of Haven's and the wet surface methods for fabrics other than Turkish toweling were tested, using knitted underwear fabrics of rayon.

In the use of Haven's method it was found that the edges of the strips curled when tension was applied, when the weights were removed the strips sagged and rested on the glass; absorption was slow and the moisture traveled too short a distance to permit accurate determinations. For these reasons it was decided that this method was not suitable for use with knitted underwear fabrics of rayon.

Difficulties were encountered in using the wet surface method with these knitted specimens. It was found that a specimen of knitted fabric could not be returned to the wet surface after the first weighing because the edges of the fabric curled. Moreover moisture clung to the surface of the glass cover. These difficulties were overcome by using a different specimen of the same weight and approximate area for each test period and by placing the glass cover in the weighting bottle with the fabric. Specimens of the same weight were prepared by cutting the required number approximately 2 inches square, weighing one on the Jolly balance and clipping from each of the others, while hanging on the balance, the slight amount necessary to make them the exact weight desired.

All specimens were dried in the conditioning oven and cooled in the desiccator preparatory for testing. One specimen was placed on the moist disk, covered with the glass, and allowed to remain for a period of 30 seconds. The fabric and glass cover were then placed in a weighing bottle and weighed. A second specimen was taken from the desiccator, placed on the moist disk, covered with the glass and allowed to remain one minute. The specimen was then weighed with the cover. This procedure was repeated with the subsequent specimens each being allowed to remain on the disk an additional period of 30 seconds until the fabric became saturated. The use of different specimens for each weighing, starting with a moisture-free specimen every time, greatly increases the time necessary for one test, but permits the accurate testing of rate and amount of absorption of moisture by knitted fabrics.

With the suggested changes in technique and under controlled conditions of relative humidity and temperature, Haven's method is recommended as a convenient and satisfactory means for obtaining the rate of absorption of moisture by fabrics other than knitted goods. Where controlled conditions of relative humidity and temperature cannot be maintained, with the suggested modifications, the wet surface method is recommended as an accurate means of obtaining both rate and amount of absorption of moisture by all types of fabrics.

Partial

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Compiled by

C. H. CLARK

Secretary, U. S. Institute for Textile Research

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Equipment and Testing for Uniform Sizing. L. W. Cronkite. N. A. C. M. Trans., V. 92, p. 289. J. W. Lindau. N. A. C. M. Trans., V. 87, p. 93.

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Thermal Depolymerization of Starch in Relation to Molecular Constitution. Ame Pictet, p. 9.

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Enzymic Hydrolysis of Starches in Relation to Constitution. Arthur R. Ling, p. 24.

Bacterial Degradation and Constitution of Starch. Hans Pringsheim, p. 35.

The Colloid-Chemical Properties of Starch. Max Samec, p. 51.

Non-Carbohydrate Constituents as a Factor in the Characterization of Starch Components. T. Clinton Taylor, p. 62.

X-ray Spectrography of Starch. Johann R. Katz, p. 68.

Chemical Nature of Certain Amylases. Henry C. Sherman, p. 77.

Role of Starch in Bread-Making. Carl L. Alsberg, p. 87.

Gelatinization and Retrogradation of Starch in the Bread Staling Process. Johann R. Katz, p. 100.

Conversion of Starch in the Fermentation Industries. Aug. Fernbach, p. 118.

Manufacture of Corn Starch. George M. Moffett, p. 130.

Manufacture of Potato Starch. Eugen Preuss, p. 139.

Manufacture of Dextrin, Envelope Gums, British Gum and Modified Starches. Victor G. Bloede, p. 158.

Starch and Flour Adhesives. Jerome Alexander, p. 175.

Significance of Starch Viscosity in the Manufacture of Paper and Textiles. Walter A. Nivling, p. 188.

Use of Starch in the Textile Industry, Particularly for the Sizing of Cotton Warps. F. D. Farrow, p. 215.

Starch-Converting Enzymes Used in the Textile Industry. H. C. Gore, H. G. Turley, L. Wallerstein and J. Takamine, Jr., p. 223.

Early Development of Starch Chemistry and Manufacture. R. P. Walton, p. 235.

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ABBREVIATIONS

Am. Dye. Rptr.—AMERICAN DYESTUFF REPORTER.
Biochem. Z.—Biochemische Zeitschrift.
Chem. Abs.—Chemical Abstracts.
J. Am. Chem. Soc.—Journal of the American Chemical Society.
J. Home Econ.—Journal of Home Economics.
J. Ind. & Eng. Chem.—Journal of Industrial and Engineering Chemistry.
J. T. I.—Journal of the Textile Institute.
Mell. Textilber.—Melliand Textilberichte.
Mell. Tex. Mo.—Melliand Textile Monthly.
Mitt. Lebensm. Hyg.—Mitteilungen aus dem Gebiete der Lebensmittaluntersuchung und Hygiene.
T. W.—Textile World.
Tex. Col.—Textile Colorist.
Tex. Mfr.—Textile Manufacturer.

● NEW PATENTS

(*Abstracted by S. O. C. M. A.*)

Condensation Product of Benzoin and Naphthol Sulfonic Acid. (More specifically, the condensation product from benzoin and 2-hydroxy-naphthalene-3:6-disulfonic acid which product is a light powder whose alkali salts are readily soluble in water, do not couple with diazo-compounds and have a pronounced affinity for animal fibers since they protect the fibers from quickly absorbing a dyestuff.) Friedrich Felix and Jakob Scheidegger, Basel, Switzerland, assignors to the firm of Society of Chemical Industry in Basle, Basel, Switzerland, No. 1,965,283, July 3, 1934.

Manufacture of Nitro-Anthraquinone-Sulfonic Acid. (Valuable intermediate for dyestuffs, comprises purifying a nitro-anthraquinone-sulfonic acid selected from the group consisting of 1,5- and 1,6-nitro-anthraquinone-sulfonic acid, by crystallizing out the same from sulfuric acid.) William A. Adamson, So. Milwaukee, Wis., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del., No. 1,965,818, July 10, 1934.

Azo Coloring Material. (For example, well boiled and dried cotton is impregnated with a solution of 8-hydroxy-2-phenyl-*a*-naphthindole, and coupled with 2,-5-dichloraniline, yielding, when produced on the fiber, generally brown shades of good fastness properties.) Fritz Ballauf and Albert Schmelzer, Cologne-Mulheim, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,967,345, July 24, 1934.

Lakes from Basic Dyestuffs. (Prepared by means of a heavy metal complex compound of a non-dyeing high molecular sulfurized phenol compound as precipitating agent; comprise various colored substances, insoluble in water, yielding coatings of good fastness to light.) Erich Hartmann, Leverkusen-Wiesdorf, and Frederich Muth, Leverkusen-I.G. Werk, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,967,360, July 24, 1934.

Production of Nitrogenous Vat Dyestuffs. (More specifically, the reaction products between tetrachloroquinone and amino-dibenzanthrone; give extremely fast dyeings in a great variety of shades on vegetable fibers.) Max Albert Kunz, Mannheim, and Karl Koeberle, Ludwigshafen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,967,363, July 24, 1934.

Halogenanthraquinone-Benzacridones. (Relates to new chloro-anthraquinone-2.1 (N)-benzacridones dyeing vegetable fiber from orange to yellowish red to pink or bluish red shades.) Max Albert Kunz, Mannheim, and Karl Koeberle and Erich Berthold, Ludwigshafen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,967,364, July 24, 1934.

Water Insoluble Azo-Dyestuff Derived from 2.3-Hydroxynaphthoic Acid Arylides. (More specifically, comprises steeping material previously impregnated with 2.3-hydroxynaphthoic acid *a*-naphthalide in the diazo solution of 4-nitro-7-methoxy-1-amino-naphthalene; yield on the fiber red to reddish-blue to reddish-violet shades of good light fastness.) Eugen Rimele and Eugen Glitenberg, Leverkusen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,967,370, July 24, 1934.

Azo Dyestuff. (Obtainable by diazotizing in the usual manner an amino-alkoxy-carbazole and coupling in substance on a substratum or on a fiber with a coupling component suitable for producing azo dyestuffs, such as 2.3-hydroxynaphthoic acid arylamides, pyrazolones, acetoacetate acid arylamides, etc.; dyes cellulosic fiber generally violet to blue to black shades.) Gerhard Schrader, Opladen, and Albert Schmelzer and Fritz Ballauf, Cologne-Mulheim, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,967,373, July 24, 1934.

Manufacture of Dibenzanthrone Derivatives. (An efficient and economical process for the manufacture of Bz2, Bz2'-dihydroxy-dibenzanthrone, which comprises the step of alkali-fusing a mixture of benzanthrone and Bzl, Bzl'-dibenzanthronyl, substantially free of oxy-dibenzanthronyl bodies; intermediate for vat dyestuffs of the so-called "Jade green" series.) Edward T. Howell, Milwaukee, Wis., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del., No. 1,967,617, July 24, 1934.

Process for the Production of Alkoxyalkyl Esters of Organic Carboxylic and Sulfonic Acids. (For use as wetting, penetrating and dispersing agents and particularly suitable as foaming agents in the treatment of silk.) Heinrich Bertsch, Chemnitz, Ger., assignor to the firm H. Th. Bohme Aktiengesellschaft, Chemnitz, Ger., No. 1,967,655, July 24, 1934.

1-*Alkylamino*-4-*Arylaminoanthraquinones and Process*

of Making Such Products. (Particularly applicable for dyeing cellulose esters and ethers, such as, for example, acetate artificial silk, yielding on the latter fast blue to green tints; more specifically, consists in causing first para-phenylenediamine and then β-hydroxyethylamine to react on leuco-1,4-dihydroxyanthraquinones, and oxidizing the condensation products thus formed to anthraquinone derivatives.) Paul Grossman, Basel, Switzerland, assignor to Society of Chemical Industry in Basle, Basel, Switzerland, No. 1,967,772, July 24, 1934.

Color Lake. (Of excellent fastness to light and brightness of shade and distinguished by great tinctorial power; essentially comprises the hydrochloride of pentaethyl triaminodiphenyl-alpha-naphthyl-carbinol anhydride combined with phosphotungstic acid and digallomolybdic acid.) Herbert Holroyd Stocks and Frank William Linch, Blackley, Manchester, Eng., assignors to Imperial Chemical Industries, Ltd., London, Eng., No. 1,967,912, July 24, 1934.

New Hydroxylated Derivatives of Paraffins. (Valuable expedients in the textile and leather industry, for example, as lubricating or greasing agents; a continuation in part of application Ser. No. 466,885, filed July 9, 1930.) Karl Keller, Frankfort-on-the-Main-Fechenheim, and Eduard Gofferje, Frankfort-on-the-Main, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,968,151, July 31, 1934.

Process of Purifying Viscose Solutions. (By subjecting the spinning solution to the action of an amphoteric metal hydroxid.) Waldemar O. Mitscherling, Bridgeport, Conn., assignor to Pacific Lumber Co., Scotia, Calif., No. 1,968,157, July 31, 1934.

Acid Wool Dyestuff of the Anthraquinone Series and Process of Making Same. (Comprises treating 1.4-diamino-2-mercapto-3-chloro-anthraquinone with an oxidizing agent of the group consisting of peroxides and per-salts and treating the 1.4-diamino-3-chloro-anthraquinone-2-sulfonic acid thus formed with resorcinol in the presence of an acid-binding agent; valuable dyestuffs for wool and acetate silk exhibiting good fastness and levelling power, yielding blue shades.) Berthold Stein, Mannheim-on-the-Rhine, and Ernst Honold, Frankfort-on-the-Main-Fechenheim, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,968,178, July 31, 1934.

Dyeing Intermediate and Process for Its Production. (Comprises coupling methyl-glucamine with diazotized para-chloro-ortho-anisidine; suitable for use in dyeing and printing processes.) Miles Augustinus Dahlen, Wilmington, and Frithjof Zwilgmeyer, Gordon Heights, Del., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del., No. 1,968,878, Aug. 7, 1934.

Sulfur Dye and Method for Its Preparation. (Comprises brilliant blue sulfur dyes having excellent fastness to washing, light and chlorine, obtained by thionating the reaction product of p-amino-phenyl-morpholine and phenol with an alkaline polysulfide solution, and precipitating the resulting dye.) Herbert A. Lubs, Wilmington, Del., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del., No. 1,968,895, Aug. 7, 1934.

Production of Aryl Mercapto Compounds. (More particularly mercapto phenols, useful in dyeing processes, wherein a halogenated phenol is reacted with a mixture of alkali sulfide and alkali hydroxide.) Keith William Palmer, Fartown, Huddersfield, Eng., assignor to Imperial Chemical Industries, Ltd., No. 1,968,906, Aug. 7, 1934.

Dyeing Preparation and Its Conversion to Dyestuffs. (More specifically comprises the sodium salt of diphenylamine-4.4′-dihydrazine-sulfonic acid and 1-(2′-hydroxy-naphthalene-3′-carbonylamino)-2-methoxy-benzene, yielding, when brought onto fibers by steaming, bluish black dyeings and printings; a divisional application of U. S. Pat. No. 1,932,152.) Arthur Zitscher, Wilhelm Seidenfaden, and Karl Jellinek, Offenbach-on-the-Main, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,968,923, Aug. 7, 1934.

Vat and Sulfur Dyestuff Preparation. (Comprising thionyldiglycol; may be employed for the printing or slop-padding of animal- vegetable or artificial fibers, such as cotton, viscose, wool, cellulose acetate, silk and the like.) Herman Berthold and Erwin Liese, Leverkusen-I. G. Werk, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,968,926, Aug. 7, 1934.

Dyestuff of the Anthraquinone Series and Process of Preparing the Same. (Relates to a new and improved process for the production of 1, 4, 5, 8-tetra-halogen-anthraquinone by reacting with halogen upon an alpha, alpha-dinitro-alpha, alpha-dihalogen-anthraquinone, which in turn may be obtained by nitrating 1, 5- or 1, 8-dihalogen-anthraquinone.) Cecil Shaw, George Crowe Semple, and Robert Fraser Thomson, Grangemouth, Scotland, assignors to Imperial Chemical Industries, Ltd., No. 1,969,044, Aug. 7, 1934.

Metal-Containing Non-Dyeing Thioderivative from Phenols and Process of Preparing the Same. (New condensation products obtainable by causing a halogen-sulfur compound, such as sulfur monochloride or sulfur dichloride, to act on phenols or homologues, or substitution products thereof in the presence of tin or antimony or a compound of same; act as mordants for fixing basic dyes.) Ernst Runne, and Karl Larbig, Frankfort-on-the-Main-Hochst, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,969,098, Aug. 7, 1934.

Dyestuff of the Anthraquinone-Acridone Series and Process of Preparing the Same. (Comprises the reaction of anthrimide-acridone compounds with metal halides condensing agents such as aluminum chloride, zinc chloride, ferric chloride and the like; vat dyestuffs yield brown shades on cotton.) William Dettwyler, Milwaukee, and Ivan Gubelmann, So. Milwaukee, Wis., assignors, by mesne assignments, to E. I. du Pont de Nemours & Co., No. 1,969,210, Aug. 7, 1934.

Anthraquinone-Acridone Derivatives and Process of Preparing the Same. (More specifically, comprises heating in an inert organic liquid in the presence of an acid ab-

sorbing agent and a condensing catalyst a 1, 2-anthraquinone-acridone compound; vat dyestuffs yielding violet shades on cotton.) Ivan Gubelmann, So. Milwaukee, and William Dettwyler, Milwaukee, Wis., assignors, by mesne assignments, to E. I. du Pont de Nemours & Co., No. 1,969,216, Aug. 7, 1934.

Manufacture of Ureas, and Substances of a Like Character of the Naphthalene Serics. (Of value as therapeutic agents or as intermediates for the production of coloring matters; more specifically, preparing ureids of the naphthalene series which comprises reacting a diaryl urea diacid halide with an aminonaphthalene sulfonic acid.) George Malcolm Dyson, Cheadle Hulme, and Arnold Renshaw, Manchester, Eng., assignors to Parke Davis & Co., Detroit, Mich., No. 1,969,299, Aug. 7, 1934.

Azo Dyestuff. (Obtained, for example, by coupling the diazo compounds of aniline or its homologues with N-methyl-4-hydroxy-2-quinoline, giving dyeings of greenish yellow shades of good fastness on acetate silk and suitable also for printing on same.) Karl Holzach, Ludwigshafen-on-the-Rhine, and Guido von Rosenberg, Mannheim, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,969,463, Aug. 7, 1934.

Printing. (Relates particularly to the preparation of improved printing pastes and vat dye pastes, especially for thioindigoid dyes.) John Elton Cole, Wilmington, Del., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del., No. 1,967,569, July 24, 1934.

● NEW CREASELESS PROCESS

The U. S. Patent Commisioner has issued U. S. Patent 1,980,676 to John T. Gibbons, a member of the firm of Zoch-Gibbons & Co., consulting chemists, of New York City, which covers a new method of treating fabrics made of cotton and synthetic fiber to produce a crease-resisting effect.

Mr. Gibbons uses Latex in his process, which is applied to the fabric in a mangle, and then, while the fabric is drying, he works the threads to prevent any cementing action.

Each thread is impregnated with a small quantity of live rubber which gives resilience and prevents crushing.

● 1934 REVIEW OF CELLULOSE PRODUCTS

Nitrocellulose is the chief product manufactured by the Cellulose Products Department of Hercules Powder Company. In 1934, the various types of viscosities were made to the most exacting limits of uniformity ever attained by Hercules. Important during the year was the continued research at the Hercules Experiment Station in Wilmington to make even better nitrocellulose and to investigate new applications for it. According to Hercules engineers and chemists, the future will witness a greater and greater use of nitrocellulose products.

● GENERAL RELEASES

The General Dyestuff Corporation announces release of the following new products. Copies of circulars describing these products may be obtained upon request.

Supranol Brilliant Blue G—when dyed from a Glauber's salt-acetic acid bath is said to produce bright blue shades of very good fastness to light. The new product is also said to possess good fastness to washing, perspiration, water and salt-water, and to be particularly suited to the dyeing of knitting yarn. In fastness to fulling it is said to meet the requirements of light and medium milling. It is further stated that its shade is only slightly dulled by chrome, it may be used for brightening chrome colors and it keeps its shade well under artificial light. Another feature is said to be its very good fastness to acid fulling as met with in hat fulling. Other claims made for this dyestuff are as follows: exhausts well from a neutral bath, good affinity for pure and tin-weighted silk, suitable for direct printing of wool and silk (Cannot be used for discharge styles).

Immedial Violet BB—a new sulfur dyestuff producing violet shades which are said to be of good fastness to light, water, washing and cross dyeing. It may be used for vulcanizing purposes and is of good solubility.

● 1935 SPRING HOSIERY COLORS

Nine new colors are featured in the 1935 *Spring Season Hosiery Card* just released by the Textile Color Card Association to its members. Each of these Spring tones, it was explained by Margaret Hayden Rorke, managing director of the Association, possesses smart individual qualities rendering it especially appropriate for wear with some important new color range in costumes and shoes.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Rayon processing man, graduate chemist, capable of taking charge of production and improvements desires connection with progressive concern. Write Box No. 841, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Foreman finishing-folding packing Cotton, Rayons, Celanese piece goods. Mgr. Supt. having any finishing troubles with Rayon Crepes. Can offer with my services a cheap foreign method not patented. 20 years New England Cotton Bleacheries and print works. 10 years New Jersey and New York City Silk and Rayon plants. Write Box No. 846, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

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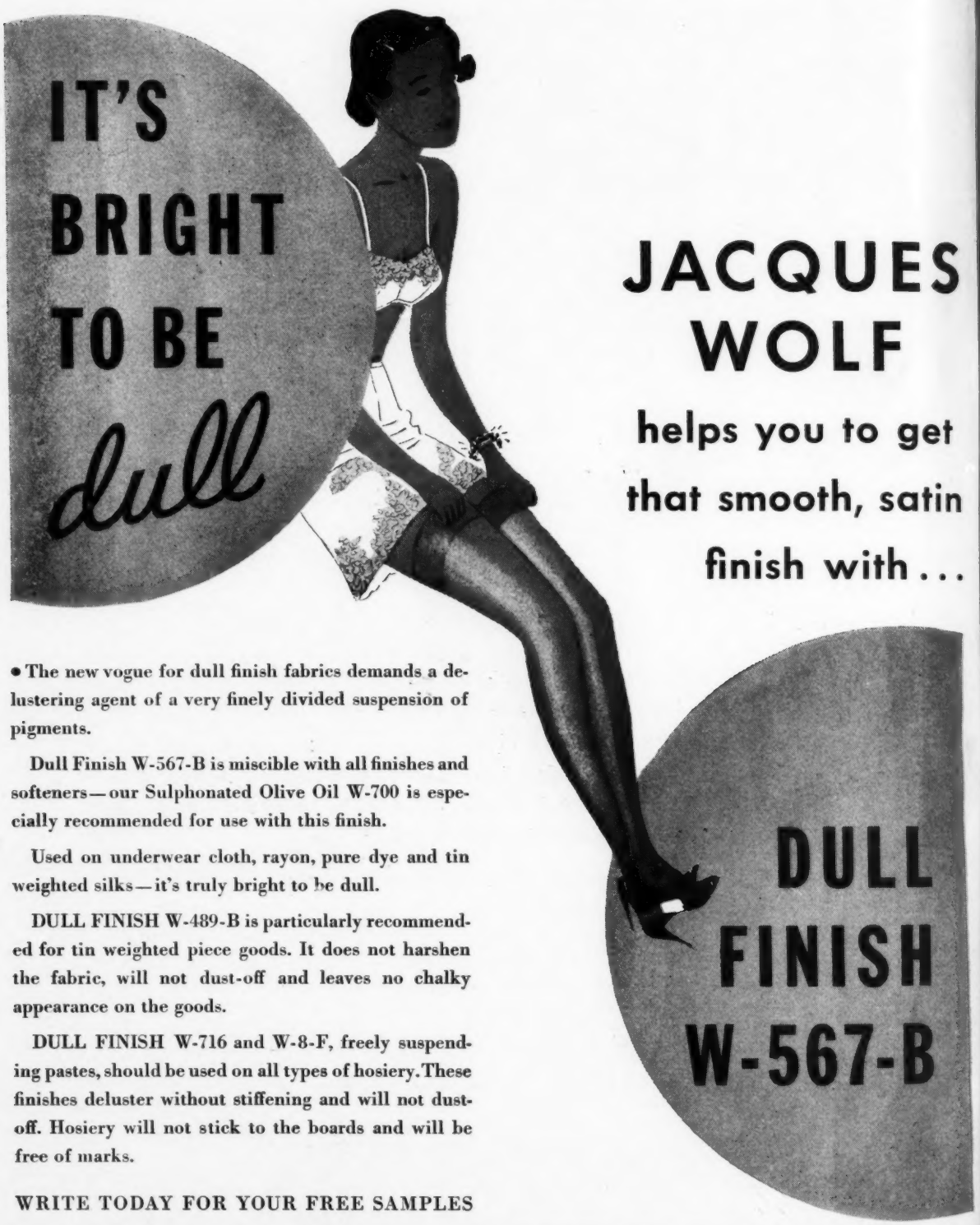

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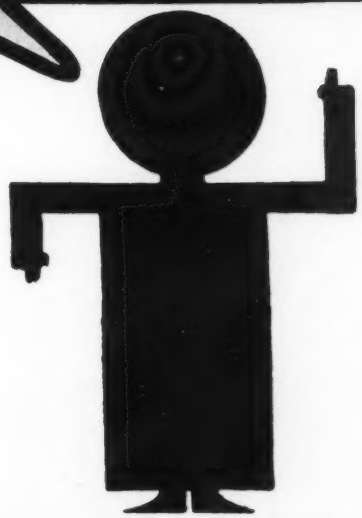

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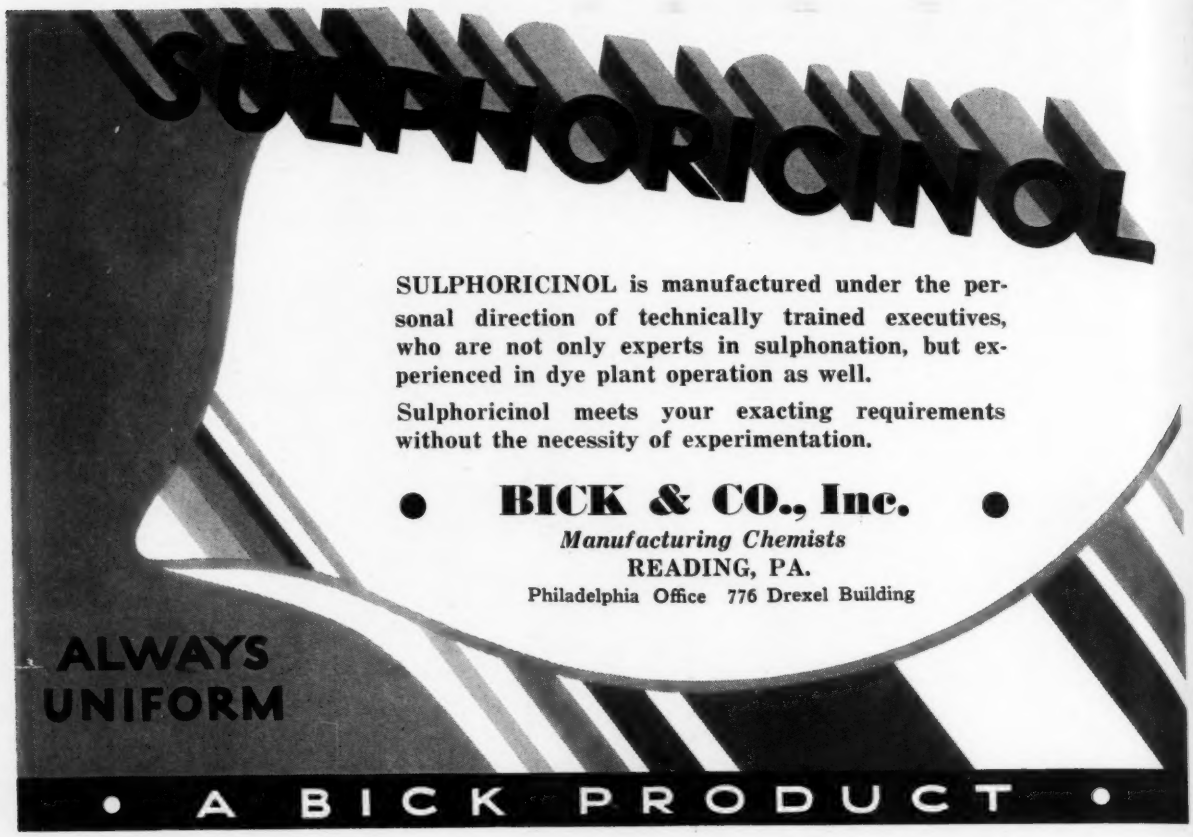
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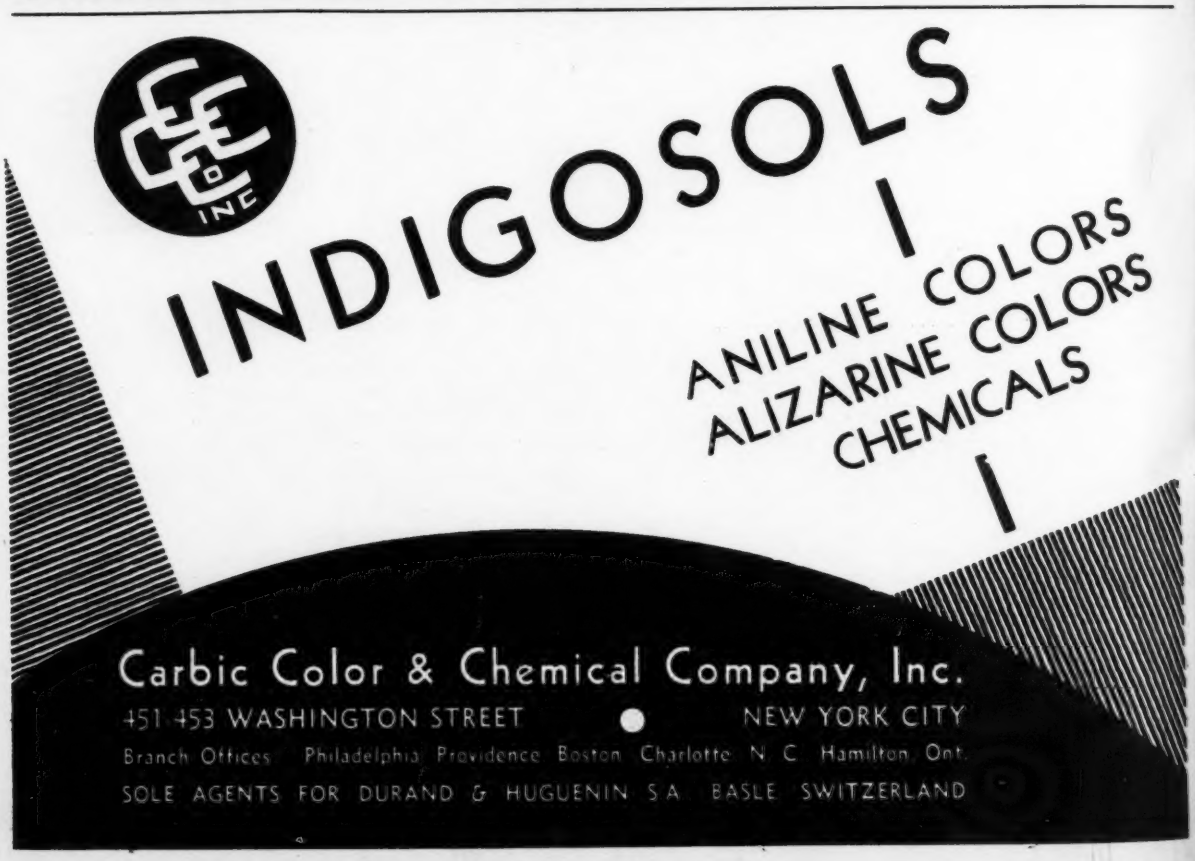
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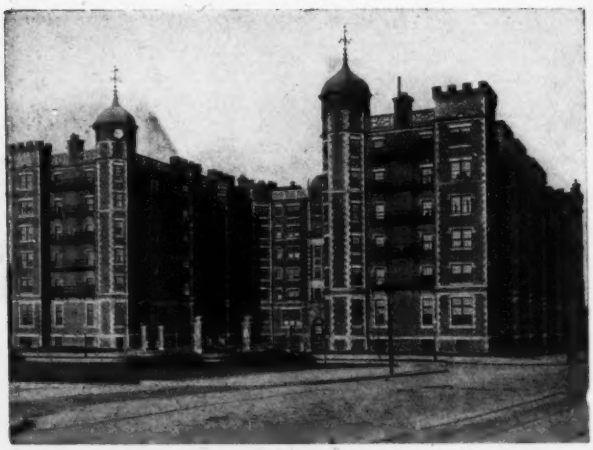

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